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PRESIDENTIAL ADDRESS*

PACIFIC COAST SOCIETY OF ORTHODONTISTS

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THE Constitution, as well as precedent, has established the fact that the President deliver an address to the members of this Society when in general session. This duty has been a pleasure as well as a task. A pleasure, because it affords me the opportunity to express my thanks and appreciation to you for the great honor you have conferred upon me in electing me to guide the destinies of this Society during the past two years. It also gives me pleasure to use this moment to pay tribute to the zeal and loyalty of those who, by much labor, made this meeting possible.

To the Program Committee, the Local Arrangements Committee, the Board of Directors and many individuals of this Society, I extend my sincere thanks for their helpful advice and cooperation.

It has been said that "In every organization there are those who get behind and push; those who climb aboard and ride; and those who ride and drag their feet." It is a pleasure to report that harmony has prevailed and that the great majority have expressed a desire to push as well as ride.

It has been a task to prepare this paper because of the fact that the President not only must report upon the progress and trend of orthodontia, but must offer pertinent suggestions for the guidance of your activities in the future.

Socrates, said to be the wisest of all men, said that the only thing he knew was that he knew nothing. We cannot predict because we do not know; but we can always learn. Trite perhaps, but true, is the thought that we must always continue to progress or surely decline.

*Delivered in general session, San Francisco, Calif., Feb. 22, 1937.

To impress upon your minds the necessity for study will be the chief aim of this address. It has been said that orthodontists are lazy, meaning that they do not actively and efficiently approach their problem in a manner that will foster the desired result. It is probably true that orthodontists have in the past depended too completely upon their individual efforts and experiences, and have failed to avail themselves of the great stores of information which a common pooling of ideas would produce.

The organization of study clubs in each Section and in each community is most heartily recommended. The incomparable benefits to be derived by the frequent meeting of those who are confronted by a common problem cannot be overemphasized. There is nothing that will contribute to the progress of the individual, as well as that of the profession, quite so much as the organization of study clubs wherever two or more can meet regularly.

The study club is a sort of popularized postgraduate course, and those who join one give evidence of an alert desire for knowledge. The members of the group experience a feeling of being at home and are at ease in the familiar presence of their neighbor. The study group should organize and select a chairman, or director, after which individual duties are assigned. Definite knowledge on so many subjects related to orthodontics is so meager, and so much of vital importance needs to be known, that you will find no difficulty in outlining a definite program that will sustain your interest indefinitely.

Take up any theme or theory and put it to the test of merciless investigation. Aside from the scientific benefits to be derived by the free exchange of ideas and of constructive criticism, is the encouragement of everlasting friendships. It is here that the virtues and faults of each are brought into the open. It is here that you learn your own limitations and learn to love and respect your competitor in spite of his faults. Your competitor soon becomes your valued friend and competition turns to helpful cooperation.

It is well to remember that the science of orthodontia is something infinitely greater than a system of mechanics. We need to draw a clear line of distinction between the three phases of our problem; namely, the diagnostic, the etiologic, and the treatment problem. For some reason, the general practitioner and some orthodontists seem to think that when the orthodontist mentions the word biologic he is attempting to impress you with a mysterious gesture of superior knowledge; trying to "high hat you"; and yet, every time the orthodontist looks for the cause he must enter the field of biology. To approach the problem intelligently you must consider diagnosis, etiology, and treatment in sequence.

The day of the squint-eye method of diagnosis is definitely past. Haphazard guessing, both in diagnosis and in treatment, must be discarded and a new approach to this problem adopted.

It is said that increasing numbers of general practitioners of dentistry are accepting orthodontic cases for treatment. We know that in the great majority of cases these men are inadequately trained, inexperienced, and poorly equipped to render this service. We cry out "there should be a law" and rightly so.

Orthodontists, however, need to prepare themselves to render a service on a plane so high as to discourage the untrained man in his attempt to follow. The dabbling general practitioner can never be eliminated, but he can and must be held in check by presenting both to his and to the public's consciousness the glaring defects of his work and his inability to meet and cope with the orthodontic problem. This can be accomplished only by making every orthodontist a good orthodontist that the comparison be more effective, and by a compelling realization that orthodontics is not merely a remunerative trick picked up by such dentists who want to monkey with appliances.

The successful practice of orthodontics in any city is dependent upon the ideals and standards of those who represent it. We must be on our guard, individually and collectively, to conduct our practices in accord with the finest professional traditions. We are faced with the menace of many things which may reduce the practice of orthodontics to the plane of low grade dental practice. The recent large influx of poorly equipped and inadequately trained practitioners into the orthodontic ranks may set standards little above ordinary commercial pursuits.

Commercial orthodontic laboratories, spreading their false propaganda through the advertising sections of dental journals, augmented by many unqualified dentists announcing themselves as specialists, tend to lower our standards to a stage little above quackery.

Perhaps we should have a law! In fact, after mature study of the State Dental Act which has recently become a law in Oklahoma, I heartily recommend that our members investigate the purposes of this law and thereby determine whether a similar law would not prove beneficial to the public and to our profession in the western states.

The Oklahoma law does not seek to divorce orthodontia from general dentistry. Its purpose, in brief, is to elevate the standards of dentistry by insisting that any man who pretends to be a specialist in any branch of dentistry, must establish the fact that he has had adequate training in that particular field.

It seeks further to prohibit commercial laboratories from diagnosing, making appliances and outlining steps of treatment for the correction of malocclusion. This law assumes that the laboratory which undertakes to diagnose and construct appliances is in reality practicing dentistry unlawfully.

We are undoubtedly facing the menace of lower standards and ideals. This is one of the major problems for orthodontists to solve, and it is possible that legislative procedure may offer the best means for their solution.

With this thought in mind I heartily recommend the appointment of a special committee, whose duty shall be to study the Oklahoma law and to report back to this Society the result of their investigation.

In approaching the subject of orthodontic education, I do so fully cognizant of its controversial nature. We on the west coast have been, until recently, particularly fortunate in that we have plied our placid way, undisturbed by antagonistic interests, all the while resting behind a fragile shelter of security. Through sheer indifference we have been lax in the promulgation of orthodontic education. The time has come, however, when we must

actively sponsor and encourage orthodontic education in a manner that will produce more and better orthodontists. We need not fear the overproduction of good orthodontists for the reason that the need for this service is much greater than is our ability to supply it.

The real menace which confronts us is twofold: first, from the ever increasing number of mercenary general practitioners who wade blindly into any orthodontic problem presented to them; and, second, from the men of earnest purpose who have been unable to obtain the proper training which they need and desire. If a man is determined to be an orthodontist, he will be a good one if he can, or a poor one if necessity demands. Unless encouraged to travel along legitimate avenues of instruction he will seek a substitute, and where will he find it? The answer is too well known; in apprenticeships, in pseudocharitable clinics, in fly-by-night schools, at allegedly qualified colleges which in reality are being organized by commercial dental laboratories, and the many two to six weeks' super courses being offered in eastern states.

Such a policy will increase the number of orthodontists but will undoubtedly lower our standards. Suffocate the well-trained men with a horde of ill-trained men and you destroy all that has been gained for our profession during the past quarter of a century. Consider for a moment these pertinent facts:

In addition to short-term courses in the East there is a traveling college of orthodontics which moves from city to city, establishing clinics for the teaching of orthodontics. Having planted the seed of "every dentist his own orthodontist," it reaches out for new fields.

In Los Angeles there is a commercial dental laboratory operating as a school for orthodontics and soliciting patronage. Mail order laboratories and publishers of texts preach the simplicity of orthodontics and find a receptive market for their wares.

Men who have been trained along the above lines are apt to regard the construction of an appliance as being the peak of orthodontic accomplishment.

The dissipation of these evils will not be an easy task; but if our specialty, the elevation of which we have labored for long and diligently, is to be maintained, we must make a decided stand on the problem of orthodontic education. I most heartily recommend the accredited Graduate School of Orthodontics as being the most sensible solution of this problem. In this way will lie progress, and in this way will the orthodontist in truth become "the dentist plus," with the credentials, knowledge, and ability pertaining to such status.

It has been said that "nothing is done finally and right, and that nothing is known positively and completely." In science probably 99 per cent of the knowable is yet to be discovered. The latest and best orthodontic appliance of today may become obsolete tomorrow. There is a back-to-earth movement in orthodontia—to a more tolerant view of the other fellow's work and viewpoint—which offers much promise of advancing the profession as a whole rather than any special group. No man or group of men has a monopoly on ideals, ability, or intelligence. Propaganda, vigorously disseminated, which attempts to establish the thought that a chosen few use methods or

appliances superior to any others, only tends to lower the whole profession in the minds of dentists and the public generally. The Pacific Coast Society of Orthodontists stands for non-sectarian orthodontia. Let us do away with sectarianism and call ourselves orthodontists, and thereby rise to a plane of professional life higher than that made by those who style themselves the Palmer Chiropractors.

There is room in this society for the expression of any concept, and we welcome the opportunity to grow in knowledge by the exchange of independent thought.

At this writing it seems probable that the 1938 meeting of the American Society of Orthodontists will be held on the Pacific Coast. It is our opportunity to be the host to this great organization. Let us at that time reveal to the orthodontic world that we are an active and progressive group.

In closing, let me say to the young men who are now entering the profession that there is no limit to the development of those qualities that make professional life most worth living. While the health value of our services must be emphasized as of primary importance, we must not overlook the esthetic. Normal occlusion gives a feeling of ease and confidence. It removes the inferiority complex and makes children feel that they have a better chance in life. To be able to contribute something toward the building of healthier bodies and better teeth and jaws of growing children is an accomplishment second to none. We must feel and believe that our profession is a noble one. The painter with his countless number of strokes with the brush creates a thing of beauty. Likewise the sculptor with his hammer and chisel. The orthodontist with his living dynamic subject molds the features of the children who smile back at him in gratitude.

To our older members let me admonish you to be always ready to generously extend a helping hand to the young men who need your counsel and guidance. In the language of Durant let us say to them:

Grow strong, my comrade—that you may stand
Unshaken when I fall; that I may know
The shattered fragments of my song will come
At last to a finer melody in you;
That I may tell my heart that you begin
Where passing I leave off, and fathom more.

THE CHARGE TO THE NEW MEMBERS*

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THE Charge to the New Members has become a tradition in our society. If judged by its title, it might be felt that this occasion serves as an opportunity for stressing certain extraordinary responsibilities to be assumed by new members, but actually this is not the case. It is rather to be regarded as a favorable time to explain to those who have recently joined us, certain of our objectives and to ask their cooperation. No question of ethics is involved, for election to membership is proof that we have all fulfilled not only certain ethical, but also strict professional requirements. Therefore, what we hope you will help to do lies outside these fundamental requirements, and deals more with those amenities which go so far to build and maintain the good name of a profession.

After all, each one of us should consider himself a liaison officer of the society, with our conduct so fashioned, and our interprofessional contacts carried out in such a manner, that both the public and other professions will look with added respect upon orthodontics. This has never been more important than at the present time, for our specialty has not yet passed from the adolescent state, and its "growing pains" are evident in many quarters. Doubtless, these ill adaptations are due to many causes, among which we may list, exploiters of so-called orthodontic education, of appliances, the laboratory racket, and last, but by no means least, our own immaturity. Unified effort on our part will, therefore, be essential to eliminate these inhibiting influences.

As the basic foundation stone, intellectual honesty must come first. This means the recognition of our own limitations which, when fully realized, will impel study habits which must last a lifetime. The emphasis given in the past to the mechanical phase of treatment has proved misleading not only to the public but also to many orthodontists, and has blinded them to other essentials of equal importance. As one such, let me mention the importance of a practical knowledge of child psychology. This is as essential as the skillful operation of appliances, for without the cooperation of patients and their sustained interest, only partial successes or dismal failures stand in the offing. Frequently, this part of treatment is our biggest problem, and requires a degree of patience and skill which must be exerted without hope of appreciation on the part of those benefited. Add to this such other essentials as those fundamentals inseparably associated with the growth problem, and we come to a fuller realization that orthodontics is not a one-phase science.

We cannot expect our patients to take the orthodontic problem seriously unless we do it ourselves. Even that portion of it associated with applied

*An address delivered by Dr. James David McCoy, a past-president of the Pacific Coast Society of Orthodontists, at the seventeenth general meeting of the Society, February, 1937, San Francisco.

mechanics is an exacting taskmaster. It is no exaggeration, therefore, to state that appliances placed upon teeth and kept there without skillful attention might, under some conditions, be accorded the odious classification of malpractice. Practitioners who have no deeper sense of obligation than to lend themselves to such methods, as a rule, have not advanced beyond the "tin-smith" age of orthodontics, and are a definite deterring influence to the good name of our specialty.

We are faced then, all of us, with the same problems, whether we be new members, or those who have endeavored to serve our specialty through the medium of our society over a period of years. High standards of knowledge and equally high ideals of practice are essential to all, and regardless of the communities served, the member who fails in his strivings for these goals hurts not only himself, but all his confreres.

Quality of orthodontic service is not a thing to be judged by the fee charged, but rather by the diligence, skill and sense of obligation of the orthodontist who renders it. In other words, there is but one type of result to strive for. If it is within the possibilities of human skill and other conditioning influences, efforts toward its realization must be carried forward faithfully so that every obligation of the orthodontist will be fulfilled. It is felt by many well-qualified practitioners that such standards of practice are not adaptable to "department store methods," nor has the orthodontic office with many "hired hands" made any noticeable contribution to the prestige of our specialty.

Many of us feel that irreparable damage has come to orthodontics because of the vacillating attitude of many practitioners toward that very important first professional contact we have with the patients which is known as the consultation. It is during this period that the problem of whether treatment is necessary or unnecessary is determined; if indicated, the most opportune time for such measures decided upon; and many other things of importance must receive honest and skillful attention. Such efforts require time and a sound judgment based upon experience, are of paramount importance to the patient, and justify a professional fee. The failure of many to sustain their rights in this matter has made the consultation a "sales talk," and has robbed orthodontics of a dignity and professional status it richly deserves. While we should be ever considerate of those deserving charity, and in cooperating with other professional confreres in the care of patients, we must recognize our legitimate rights in this connection. Unless we assert ourselves, we cannot expect the public's attitude toward us to change, or to see the "shopping evil" brought to an end. As matters now stand, harmful confusion and much loss of time result.

The observance of other amenities will also stimulate professional advancement. It is hard to conceive of any one who has reached the point where he is willing to announce himself as an orthodontist doing such things as naming a fee over the telephone without having seen the patient, or indulging in such crudities as making "follow-up" telephone calls after patients have been in for consultation and have not yet decided to go ahead with treatment, or in quoting to patients the supposed fees of other men, thereby practicing the technique and manners of the gossip, or examining the mouths and appliances

of a patient under the care of another orthodontist except by his request, or to meet some emergency, and last, but by no means least, expressing an opinion of a case under the care of another orthodontist without his knowledge and consent. It is rather unfortunate that orthodontists are frequently encouraged by confreres in the dental profession to commit some of the indiscretions just mentioned. Not infrequently, they create "shopping" by giving a prospective patient the names of several specialists, with instructions to "call on them all and see what they have to say." Such "wholesale" references are doubtless errors of the head and not of the heart, but we should discourage their continuance, and through proper channels of education eventually bring them to an end.

It would prove helpful to us all if a more uniform plan of office routine could be the vogue. This would see the periods after school and on Saturday mornings reserved exclusively for routine appointments, the hour between two and three for consultations, and the morning hours, except on Saturday, given over to the exacting detail work essential in laying the foundation for treatment. Many of us do adhere strictly to this plan, but the fact that we do not have the full cooperation of our fellow practitioners renders the situation difficult from more than one standpoint. A little moral courage on the part of the weak and wavering would soon correct this situation and prove helpful to all practitioners.

Orthodontists may be mutually helpful to one another in the sharing of ideas, at other times than at our official meetings, through the exchange of professional calls. Practitioners making such calls, however, should show consideration so that no inconvenience will be inflicted by their visits. Men of the same community or visitors from a distance may prove a joy, but a lack of consideration on the part of the caller may render such visits a hardship. An orthodontist should, therefore, always take the time to telephone the secretary of the man he desires to call upon, and find out when such a pleasant interlude can be arranged. To "barge" in unannounced during the stress period of the day and interrupt long-standing appointments, is not the way to build helpful and pleasant professional associations. The same principles of courtesy apply in responding promptly to professional correspondence. To do otherwise places one under the suspicion of being both unfriendly and selfish.

Orthodontic progress comes slowly and requires unified effort. The problems of our specialty are many, and are so varied that the talents of numerous minds must be utilized if they are ever brought to the point approaching finality. In this effort, each of us may play a part. It is with deep sincerity, therefore, that we welcome you, the new members, to join us in a task which will require intelligent effort, optimism, tolerance, and never-ending courage.

MOVEMENTS OF THE JAW AND HOW THEY ARE EFFECTED

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AT THE fall meeting of the New York Society of Orthodontists in 1935 I gave an informal talk on the movements of the human jaw and tried to show their vital relation to problems which daily confront the orthodontist and the prosthodontist. These remarks I have here attempted to put into more suitable form for publication. Any applications of the anatomic and physiologic data are here given by one who is not trained in your problems, though deeply interested in them for many years, and I hope you will find them worth your consideration.

A good part of the descriptive material here given has been published earlier.*^{1, 2}

This study of the jaw was made at the suggestion of the late Dr. Henry James Prentiss, Professor of Anatomy at the State University of Iowa, under whose direction I was teaching medical and dental students at the time, and the study has been continued since I took charge of the Department of Anatomy in Dartmouth Medical School.

In order to obtain satisfactory results from their treatments the orthodontist and the prosthodontist need to know very exactly the conditions which govern the motion of the jaw and which determine the occlusion for every tooth. Every one knows that even a raspberry seed between the teeth feels as large as a hazelnut, much as a cinder in the eye feels like a large lump of coal. This indicates the closeness of fit of the teeth and suggests the need for accurate information as to the bones, the muscles and all the parts concerned in jaw movement, and the exact mechanics involved in their use. To illustrate further the need for careful study and analysis of the jaw mechanism, let us first examine certain facts as stated in the ordinary anatomic literature, concerning the function of the muscles which move the jaw. We learn that opening of the mouth is caused by action of the inframandibular muscles—meaning the suprathyroid and infrahyoid groups—one only among the commonly used textbooks mentions the external pterygoid muscle as an auxiliary to the former in opening the mouth.

In accordance with this explanation we find first that it brings into use for this action a large number of different muscles, mylohyoid, geniohyoid, digastric, sternohyoid, sternothyroid, thyrohyoid, and omohyoid. This is contrary to the usual situation elsewhere in the body where one or very few muscles carry on such *fundamental* movements; while in this case this motion would be carried out by the use of a large and complex group, requiring an elaborate synchronizing mechanism. Second, we have certain clinical evidence, easily acquired. If you feel the muscles in your own neck as the jaw is being opened “naturally” (I use this term throughout this paper to mean opening simply, without effort, as

*The publishers of the *Anatomical Record* have kindly allowed me to use whatever I desired from their journal for this paper.

in eating), you can feel the contraction of none of the infrahyoid group. If you open the mouth forcibly (as against resistance of the opposing hand), these muscles are easily felt to contract. Third, we note that these suprathyoid muscles, chiefly perhaps the digastric (the hyoid being fixed by the infrahyoid group), are inserted into the jaw at the farthest point possible from any possible fulcrum, making the power arm longer than the weight arm. If this is true, it is almost the only such case to be found in the body. And last, as we analyze this statement as to the muscles opening the jaw, we observe that none of them advances the condyle of the mandible, but rather by the direction of their pull they tend to force it backward instead. No muscle in existence except the external pterygoid could advance the condyle, and we know the condyle does advance whenever the jaw is opened.

In the *Boston Medical and Surgical Journal* in 1889 Dr. Charles E. Luce, a physician and dentist in Boston, gave the results of an attempt to photograph the human jaw, carrying bright points on a device attached to the jaw, and giving tracings on a photographic plate which correspond to the actual motion indulged in at every point of the jaw. This proved in a very pretty fashion what is now well known (and earlier as well) that the condyle moves forward as the chin descends, and that the actual transverse axis about which the jaw turns in opening and closing is through the midpoint of the ramus. The inframandibular muscles could not be responsible for such a motion, and it is very obvious that our data as ascertained from several textbooks are incomplete or incorrect.

With this bad start the only logical procedure is to turn to original sources and to examine carefully by all means at our disposal the actual structures concerned, bones and soft parts. Although these various structures are well known to you, I am taking the liberty of reviewing these data somewhat in detail, especially to call attention to certain parts too often overlooked or passed by without a comprehending estimate of their value.

The condyle is an olive-shaped process, its long axis in a horizontal plane, but so twisted that the axes of the two condyles, if prolonged, would meet well behind the mandible. Its axis is also practically at right angles to the forward path it takes when the mouth is opened. The glenoid fossa is an olive-shaped pocket on the under side of the temporal bone, directly above the condyle, but not exactly fitting the condyle, being slightly larger and slightly differing in shape. Its highest portion is so thin that in a skull with the upper part removed one can see daylight through its thin structure, evidently not built to stand much strain. The articular eminence is a rounded ridge lying just in front of the glenoid fossa, parallel with it, making an apparent obstruction to any forward motion of the condyle from its normal position in the glenoid fossa. The joint capsule, not very different from that of most joints, possesses collateral fibers which allow the condyle to swing forward and backward beneath the eminence. The mandibular (inferior dental) foramen for the entrance of vessels and the main nerve of the lower jaw is found on the inner face of the ramus about halfway between the condyle and the angle, being practically in the occlusal plane. In almost all the moving parts of the body vessels and nerves

enter their structures where the motion is the least or nearly so. This would fit in with the location of the axis of rotation of the mandible, so well demonstrated by Dr. Luce.

* Two peculiar ligaments, not closely related to the capsule, pass over this joint, the sphenomandibular and stylomandibular ligaments, the explanation for whose existence is difficult to find in the texts. The first runs from the sphenoidal spine, not far mesial to the joint, and is attached to the lingula, a small process just in front of the mandibular foramen; the second runs from the stylohyoid ligament, as a band or thickening of the stylomandibular fascia, and is attached

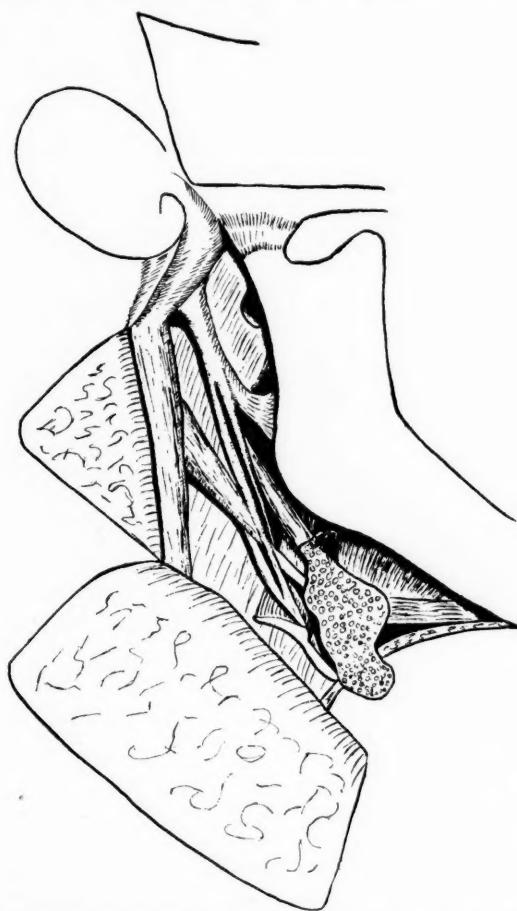


Fig. 1.—Dissection to show stylomandibular ligament, running from the styloid process to the posterior border of the mandible just above the angle.

on the dorsal border of the ramus about halfway down, that is, a little behind the attachment of the first ligament. This stylomandibular ligament has its bony anchorage through the stylohyoid ligament at the styloid process of the temporal bone, lying a little behind and mesial to the joint. (Fig. 1.) Both ligaments therefore run from the solid skull above downward and forward to the midramus, the part of the jaw which we know is at its axis of motion for closing and opening.

The articular fibrocartilage, or meniscus, of this joint is a tough fibrous or fibrocartilaginous disk, placed between the condyle and its temporal bearings,

adapting exactly the shape of the condyle to the glenoid fossa, making up for the slight misfit previously noted between these two bony parts. Attached at its periphery to the capsule, it separates the joint into two parts, meniscotemporal and meniscomandibular. Into its ventral edge is inserted the upper head of the external pterygoid muscle. It is a remarkable structure as seen when examined carefully as to its thickness in different parts. This can be done on the actual meniscus itself, or by examining a wax cast taken by inserting a bit of dental wax between condyle and temporal bone in any skull with a good set of teeth, and placing the teeth into perfect occlusion. The hiatus between these bony parts of the joint is practically that occupied in life by the meniscus, and in this way an almost perfect replica of any meniscus for any complete skull with good teeth can be obtained. The cast, being translucent, can be better examined than the actual meniscus and can easily be sectioned and measured. In this way we learn that this meniscus is thickest at a region lying directly above the closed condyle; it is thinnest at a region lying between condyle and articular eminence, about halfway from the highest point of the glenoid fossa to the lowest point of the eminence, and is almost of paper thinness at this place. The rest of

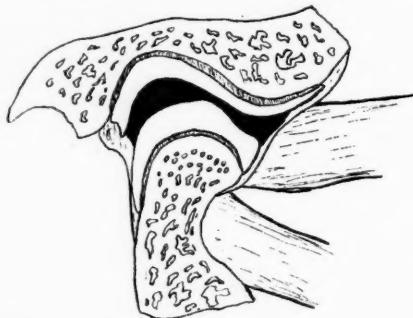


Fig. 2.—Sagittal section of temporomandibular articulation.

the meniscus is intermediate in thickness. The disposition of the thin and the thick portions is of supreme importance in the mechanism of the joint. (Fig. 2.)

If the condyle is moved forward to lie directly beneath the eminence, and if the meniscus remains unmoved, the condyle, to achieve this position, would be forced against the resistance of the eminence, which is still covered by a fairly thick portion of the meniscus lying beneath it. The condyle could advance to this position only if it also moved downward by an amount equal to the thickness of that part of the meniscus under which it is brought to lie. If, on the other hand, the condyle is moved forward as before, but the meniscus is also pulled forward by a lesser distance so that its thinnest portion comes to lie directly beneath the eminence, then the condyle would meet no resistance as it advanced to its new position beneath the eminence, starting from a level well below the highest point of the glenoid fossa, where the thickest part of the meniscus is interposed, and ending at the eminence where a portion of the meniscus of almost negligible thickness is interposed. It would have advanced smoothly and practically in a straight line from the closed to the open position of the jaw. In such a situation as that just described the apparent barrier offered by the eminence would be obliterated by the varying thickness of the advancing

meniscus and the jaw would open easily if a properly directed straight pull were made at the condyle. When closed the condyle would rest firmly fixed in its fossa. (Fig. 3.)

It remains to be seen whether the existing muscles are so placed as to pull the meniscus forward, as the jaw opens, just enough to bring the thinnest part beneath the eminence and at the same time to pull the condyle forward about twice as far in a straight line. If we can find that the muscles are constructed so as to do this, we have gone a considerable distance in settling the question as to just what muscles *do* open the jaw.

Before taking up the question of these muscles I should like to refer to an interesting bit of evidence I discovered illustrating very graphically the actual path taken by the advancing condyle, one of the essential elements in understanding the mechanism of the jaw joint. In the Peabody Museum of Harvard College I found a skull of a native of Algoa Bay which I described in a previous article.² This skull, which possessed normal teeth and normal

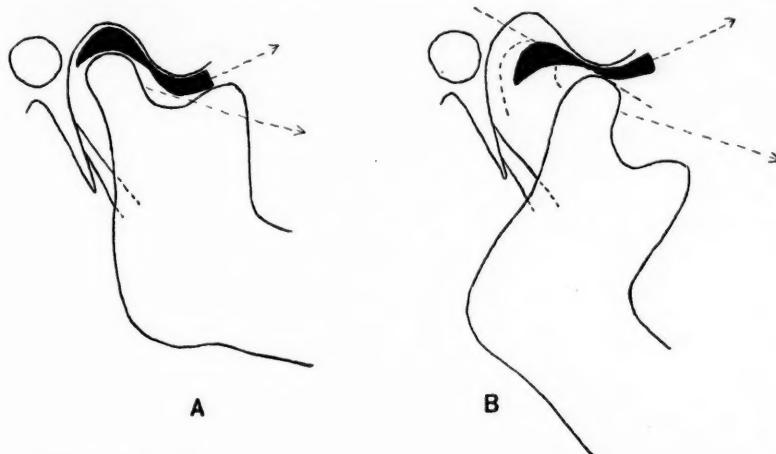


Fig. 3.—Condyle in relation to both meniscus and glenoid fossa when mandible is open and closed. Upper arrow gives direction of pull of upper head of external pterygoid, lower that of its lower head, dotted straight line in B shows path taken by advancing condyle. Styloglossomandibular ligament is seen fixing midramus.

occlusion throughout, showed practically normal joint structures on the left side but on the right the bones were decidedly pathological, presumably due to an extensive arthritis that had eventually healed. When the jaw was firmly held in occlusion there was found, as in an ordinary skull, a hiatus between the condyle and the temporal bone on the left side, exactly the shape of the missing meniscus (easily reproduced for examination by the taking of a wax impression) and which seemed entirely normal in every way as to its measurements. On the right side there was no such curving hiatus, but the condyle and the temporal articulating surfaces met as flattened surfaces, in the form of an inverted trough, directed forward and slightly downward, representing the exact slope of the plane in which the condyle of the normal other side would have moved if the meniscus had moved with it and about half as far, as mentioned above. (Figs. 4 and 5.) It appeared from the identical wear of the teeth on both sides that the condyles of the two sides had moved in the same plane and

for the same distance, although one side possessed a meniscus and the other did not. On the right side a special, though pathological, set of surfaces in contact had been built up, as the newly formed bone adapted itself to the actual path of its condyle during the process of healing and with the continued use of that joint. To my mind this offers a sort of "ossified evidence" as to how the condyle moved in this case and suggests a similar motion in any normal skull. This peculiar formation, in addition to the evidence on structure previously given, makes it all the more necessary to examine the information furnished by the muscles as to their part in jaw motion.

The closing of the jaw is mainly effected, it is clear, by the anterior fibers of the temporal, the masseter and the internal pterygoid muscles, all running from the lower parts of the skull to some part of the ramus between the condyle and the angle, and all pulling upward and forward, forcing the teeth together. The forward component of pull of these muscles explains the thin roof of the

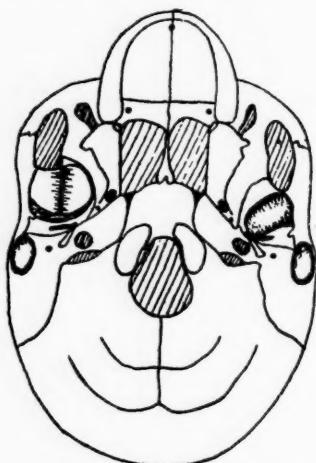


Fig. 4.

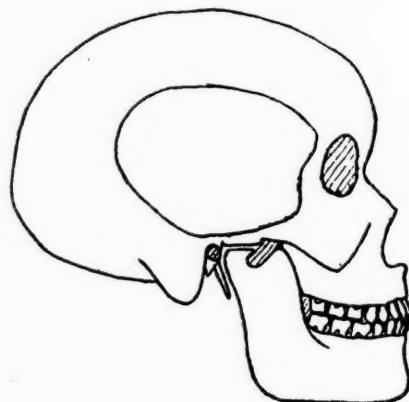


Fig. 5.

Fig. 4.—Drawing of base of skull to show articulating surfaces for mandible. The broad oval area on the left of the figure is the pathologic troughlike surface, articulating with the right condyle, shown in Fig. 6. The narrower oval of the opposite side of the skull is almost normal.

Fig. 5.—Drawing of right side of skull. This shows the flattened articular surfaces of the pathologic right jaw joint, which allow the condyle to move forward and backward only in a straight line. The line of pull of the lower head of the external pterygoid muscle makes an angle of about five degrees with that of the joint surfaces, and is so directed as to pull the mandible against the skull during contraction.

glenoid fossa, as the pressure of the condyle due to this pull is applied not to the glenoid roof but to the dorsal part of the articular eminence. These muscle attachments give what is practically a universal pattern for all muscles, in which the power arm is shorter than the weight arm, though with an unusually high percentage of power as actually applied at the chewing surfaces. It is to be noted that while the anterior temporal fibers pull the jaw upward in a vertical plane, the masseter has in addition a lesser component tending to pull the jaw laterally, while the internal pterygoid in the same way has a component tending to pull the jaw mesially. The angles of these sidewise components are not the same in these two muscles, being about twice as great for the internal pterygoid as for the masseter. Evidence of this difference in angles of the two

muscles was well shown in graphic form in the slopes of the condyle surfaces of the diseased joint of the skull from Algoa Bay, as can be seen in Fig. 6. The posterior fibers of the temporal muscle, as indicated by their direction, pull the condyle backward, and also somewhat upward to hold it firmly against the temporal part of the joint, as the advanced condyle reverses its direction when the jaw is closing. No other muscles than these are needed or can be found which close the mandible.

What muscles effect opening of the jaw? From their attachment and direction one naturally considers the suprathyoid group, best represented by the digastric, as a sample; for their pull is downward and backward at the point of the chin, provided the hyoid bone is fixed to the sternum by the anchoring infrathyoid group. Mechanically such action is unquestionable. The pull of the digastric, like that of the others, would lower the chin and carry it somewhat backward, a motion that certainly occurs in opening the mouth; but

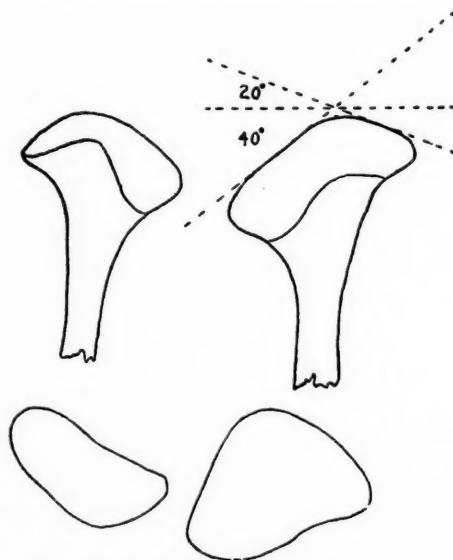


Fig. 6.—Drawing of condyles of mandible. The upper figures show the condyles as seen from behind; the line below the upper part of the drawing gives the edge of the articulating surface. The lower figures show a view of the condyles from above. In each case the right-hand figure represents a view of the pathologic right side, showing its enlarged and altered articulating surface. The dotted lines show the approximate number of degrees of slope from the horizontal of each side of the joint surface.

it tends also to pull the condyle *backward*, as stated earlier, whereas we know the condyle travels *forward* in this motion as the chin is lowered. This group then tends to *prevent* a motion which always is found in opening the mouth. The insertion of the digastric and the geniohyoid seems to violate the rule as to the relative lengths of power and weight arms mentioned above, and such a reversal of lever arm lengths for muscles would be very unusual, especially in such an oft-repeated, fundamental motion as opening the jaw. It does not prove, however, that this action cannot exist. Opening the jaw against resistance, as against the pressure of one's hand, makes it possible easily to feel the contraction of these inframandibular muscles, a proof that the digastric, among others, does open the jaw under this unusual condition. Compared with

the ordinary "natural" opening of the jaw as in eating this is as unusual as is forced respiration compared with ordinary normal respiration. Both these forced movements can and do occur, but they are not usual and are properly called "forced."

Opening the jaw naturally, as in eating, in "natural" as opposed to "forced" opening, gives no observable evidence of contraction of any muscle at all. It is apparently not the function of the digastric and its associates to accomplish this *common action*, and they are at least "suspect" as agents in this case, though they do act in "forced" opening. In the "natural" opening process, such muscle or muscles cannot therefore be at the surface and must be deeply placed. There is but one muscle attached to the mandible left to consider, and that is the external pterygoid. Its lower head, a fairly powerful affair, inserted into the neck of the condyle, certainly lies in a direction to pull the condyle forward, a motion we know as always accompanying opening of the jaw. The length of the muscle indicates that it could well pull the condyle the distance from the glenoid to a point well beneath the articular eminence, and this distance is about one-third as great as that through which the chin travels at the other end of this bone, a distance which the digastric is well qualified to effect. The upper head of the external pterygoid, not so powerful as the lower, inserted into the front edge of the meniscus, certainly is so directed as to pull this disk forward, and because of the attachment of the meniscus to the back of the neck of the condyle, it pulls the condyle forward also. This muscle, like the posterior temporal fibers, has a component pulling the meniscus somewhat upward, which holds it firmly up against the eminence, and the condyle, in its turn, is firmly held up against the lower surface of the meniscus by the capsule and by the closing muscles. From the relative length of the two heads of the external pterygoid it is apparent that the amount of contraction of the upper head is less than that of the lower, perhaps one-half as much, and it would therefore tend to pull the meniscus forward only about one-half as far as the condyle is advanced by the lower head. Such a ratio of movement would bring the thinnest part of the meniscus from its original position at the back of the eminence so as to lie directly beneath the eminence, while the condyle moved from its position beneath the highest part of the glenoid fossa to the same place, to lie directly beneath the thinnest portion of the meniscus. In this way, as shown when we examined the meniscus earlier, the condyle would be moved forward in a straight line and against no obstruction from the eminence. (Fig. 3.)

So far as forward motion of the condyle is concerned in "natural" opening of the jaw it is plainly seen that it can be effected only by the two heads of the external pterygoid acting together and with a minimum of energy or contracting effort on the part of these muscles. All the anatomic evidence favors this conclusion even though we are unable to see or feel the contracting muscles. Add together in "forced" opening of the jaw, the action of the external pterygoids at the condyle and the digastric and its associates at the chin, remembering their relative lengths or contraction, and the result is an advance of the condyle and a descent of the chin, the latter traveling about three times as far as the former. The resulting axis of such a motion is located at a point about

one-third the distance from chin to condyle, that is, at the region of the midramus or the mandibular foramen. (Fig. 7.) This fits in with Dr. Luce's experiment as well as with the anatomical facts.

But all these data still leave us with a much needed explanation of the "natural" opening of the jaw when the digastric and its aids are *not* used. Gravity is certainly not the agent, for we eat as well when we lie on one side. The platysma myoides is attached at its lower end to the skin of the chest, and it would require, in the use of this muscle to open the jaw, fixation of the skin of the chest, as with one's hands. Again in this fundamental motion of opening the mouth the external pterygoid is the only muscle which could act, all other candidates being ruled out. But when this double muscle acts, it can only pull the condyle and with it the jaw *forward*, effecting a part only of the motion existing in the process of opening the jaw. Here comes the part played by the two structures which are ordinarily left out of consideration entirely, the two

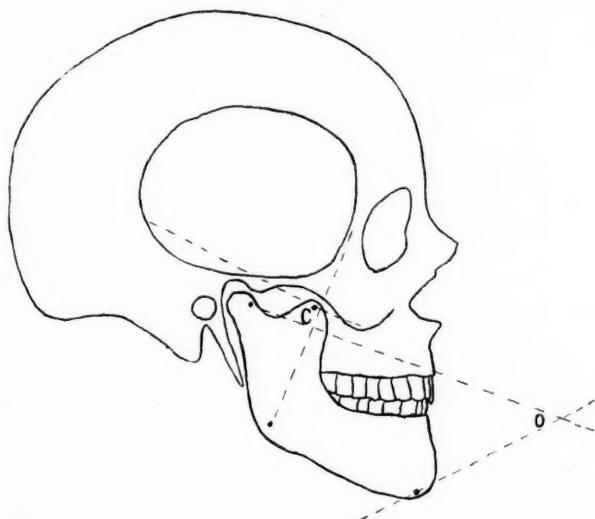


Fig. 7.—Diagram to show direction of lines of force of muscles opening and closing mandible. Lines meeting at O show directions of pull of lower head of external pterygoid and digastric, used in "forced" opening. Lines meeting at C show directions of pull of posterior fibers of temporal and masseter (together with internal pterygoid and anterior fibers of temporal) in closing mandible. Both pairs of lines are seen to rotate mandible about midpoint of ramus.

special ligaments, the sphenomandibular and the stylomandibular. As the pterygoid heads contract they immediately make taut these two ligaments, which therefore arrest the forward motion of the midramus region. Further pull by the external pterygoids causes the jaw to tilt, rotating on an axis through the region of insertion of these two ligaments, the region of the mandibular foramen or the midramus, and the chin descends as the condyle continues to advance. As the distance from axis to condyle and axis to chin is about one to three, so the chin drops thrice as far as the condyle advances, and the mouth has normally and naturally opened. The external pterygoid muscle alone has acted and with the aid of these neglected ligaments has effected a fundamental motion, easily and inevitably accomplished.

In "forced" opening of the jaw these two special ligaments would not be strong enough to hold the midramus fixed, and they would very likely be torn

or stretched by a too strong pull of the external pterygoids. From the evidence obtained by feeling of the inframandibular muscles while opening the mouth, it seems that automatically with this stronger effort the digastric with its associates is thrown into play, the backward pull of the inframandibular muscles offsetting the forward pull of the external pterygoid. As a result the axis of motion, or fulcrum, still remains at the same place as before. It matters not then whether "natural" or "forced" opening is attempted, the relative axis for motion in either case is always at the region of the midramus, produced in the first instance against the drag of the stylomandibular and the sphenomandibular ligaments and in the second place by the balance between the external pterygoid, on the one hand, and the inframandibular muscles, on the other, in their proportion of one to three.

To return for a bit to the mechanics of closing of the jaw, the special ligaments are of course of no value in this case, as they become taut only against the forward pull of the condyle, which must move backward during closing. The anterior temporal fibers, masseter and internal pterygoid muscles, all, pull upward and forward the body of the jaw, while at the same time the posterior temporal fibers pull the condyle back into the glenoid fossa, and, as seen by the relative lengths and directions of pull of these muscles, the two sets, working in a proper proportion, rotate the jaw about the same axis as that used in opening. (Fig. 7.)

In opening the jaw it would appear that the mandibular incisors tend to be pushed against the lingual face of the maxillary incisors by the forward motion of the condyle, but this tendency is obviated by the fact that the chin drops at the same time, thus voiding any such effect. Also, due to the direction of pull of the external pterygoids, the plane of the condylar path, while almost parallel to the occlusal plane, is tilted somewhat downward to the latter, making a small angle with it. This tilt helps still further the easy disengagement of the incisors. In closing, the shearing effect is partly aided by the backward journey of the condyle effected by the action of the posterior temporal fibers, as the main closing muscles force the teeth into occlusion. This shearing action is further facilitated by the slanting of the lingual faces of the maxillary incisors, which assist also in forcing back the condyle.

Trituration is easily explained after its mechanics are understood. To chew on the left side, for instance, the right external pterygoid, both heads, contract, but not the left. The right condyle is pulled forward about the left condyle as a center, thus swinging the chin to the left, as the buccal cusps of the mandibular left molars swing below the buccal cusps of the maxillary left molars. At the same time the right special ligaments are made somewhat taut, fixing the right midramus, to prevent its advance, and the chin is forced down slightly, separating the teeth by a small interval, enough for the tongue to interpose into this space the food to be chewed. In this way the action of a single muscle, alone, the two heads of the right external pterygoid, is all that is necessary to carry on this many times repeated action in eating.

To triturate the food now in proper position the right posterior temporal fibers contract, returning the right condyle to its original place, during which

motion the greater part of the main closing muscles grind the food between the teeth, as the mandibular left buccal cusps swing back into their groove between the buccal and the lingual cusps of the maxillary left molars. Those closing muscles which would pull also to the right, the right masseter and the left internal pterygoid, probably contract more vigorously than the others; although much of the result may be accomplished as the mandibular left buccal cusps slip along the slanted lingual surfaces of the maxillary left buccal cusps, the former being gradually forced mesially to their original position.

If these anatomic and physiologic facts are as I have given them, and there is no question in my mind that they are observed and interpreted fairly, it should be possible to take a skull with good dentition, and to reproduce the

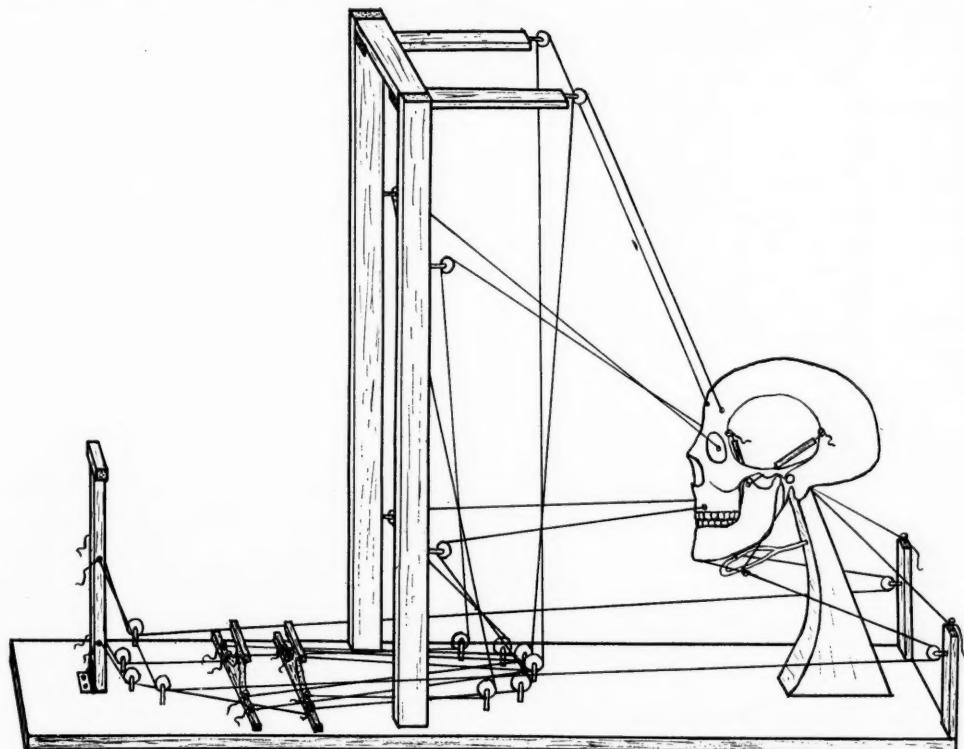


Fig. 8.—Semi-diagrammatic drawing of model. The pair of strings through the forehead act as internal pterygoid muscles; those passing through the orbits, as upper heads of external pterygoids; those passing horizontally outward from just above the maxillary teeth, as lower heads of external pterygoids; the lowest pair as digastrics. Pulling back and releasing the upright at the left end of the drawing opens and closes the mouth; rotating, back and forth through a small arc, the smaller pieces which are pivoted on a central point, produces trituration, one for the right, the other for the left, side of the mouth.

softer parts, meniscus, capsule, special ligaments, and muscles, so as to obtain the exact results which are produced in any one of us in using our own jaws. Some years ago I made such a model, a replica of which was shown before the New York Society of Orthodontists in 1935, to demonstrate in this way the true movements of the mandible. This was described in the *Anatomical Record*, as cited above. The meniscus was made by taking a wax impression of the space between condyle and temporal bone of each side when the teeth were held in firm occlusion, and through the aid of a dentist friend this impression was reproduced as a rubber meniscus, one for each side. Ligaments were made from wire or tough cord.

Muscles were made by using stout string, attached at the center of insertion of each muscle concerned and passing through a hole in the skull, bored exactly at the center of origin of the same muscle, to run over properly placed pulleys to wooden levers or handles attached to the front of the platform on which the skull was mounted and where they could be manipulated at will. In this way the model was made to simulate the exact conditions of the jaw mechanism, as shown in Fig. 8. It had two nicely working menisci, well lubricated so as to move in their proper fashion, a stylohyoid ligament to which was attached the stylomandibular ligament (the somewhat redundant sphenomandibular ligament not being necessary) running to the midramus, and almost all the muscles working on the jaw, including the two heads of the external pterygoid separately and the digastric (representing the most important inframandibular muscle), which could be made to contract by pulling the levers to which their representative strings were attached. The masseter, internal pterygoid, anterior temporal fibers and posterior temporal fibers, kept taut by springs, ran from midorigin to midinsertion in every case. By pulling the right and the left external pterygoid strings the condyles and menisci of both sides were pulled forward in proper proportion (about one to two), the two stylomandibular ligaments at once became taut, fixed the two midrami, so that the jaw rotated on these two points of attachment of the special ligament, and the chin was forced downward and backward, giving an accurate reproduction of what occurs in "natural" opening of the mouth. Adding the pull of the digastric strings to that of the two external pterygoids made no obvious difference in the result; the jaw opened in exactly the same way, though with greater force. When the pull of the external pterygoids in "natural" opening, or of these and the digastrics in "forced" opening, was relaxed, the closing muscles, as taut springs, closed the jaw as naturally as it opened, the condyle was pulled back to its fossa, and the chin upward until the teeth met.

Pulling the right external pterygoid, only, caused the teeth to open a crack and swing to the left into a position ready for chewing on the left side. Releasing its pull, the closing muscles caused the teeth to come together and swing back to their original position, effecting a natural chewing action. The model could chew equally well on either side.

If one observed one of the mandibular incisors, for example, during the action of chewing, first on the right and then on the left, he noted that it described the arc of a circle, first left then right, the two arcs meeting at an angle in the middle position, and forming the well-known Gothic arch.

This model, carefully adjusted, for it is a rather delicately balanced affair, simulates almost perfectly, by the manipulation of the levers, the motions of opening and closing and of chewing, illustrating the fact that, given the construction as here stated, you cannot but get these normal results.

To illustrate graphically the motion in various parts of the mandible I attached several well-polished shot to the lateral face of the bone, from condyle to chin, caused a bright light to shine on that side of the model to bring out a bright point of light on each shot, and then photographed on one negative the jaw during opening by the levers. This photograph showed a tracing for the point of light on each shot, each line being a graph of the motion of that

special part of the jaw to which the shot was fastened. These tracings, as seen in Fig. 9, showed the direction and amount of motion at the condyle, at the midincisor point, at the midramus and at points between these, and it was easily seen that these various parts moved in the direction and to the degree shown long ago in Dr. Luce's experiment on a living jaw.

This explanation and demonstration of the causes and kinds of actions at the jaw joint in opening and closing in chewing are of interest to the anatoomist and the physiologist, but what interest do they have practically? Do they have anything to do with the study of the formation and shape of the growing skull or jaw? If any of the normal structures, jaw, joint, or teeth, are altered by any means, will that abnormal condition be reflected in other structures and

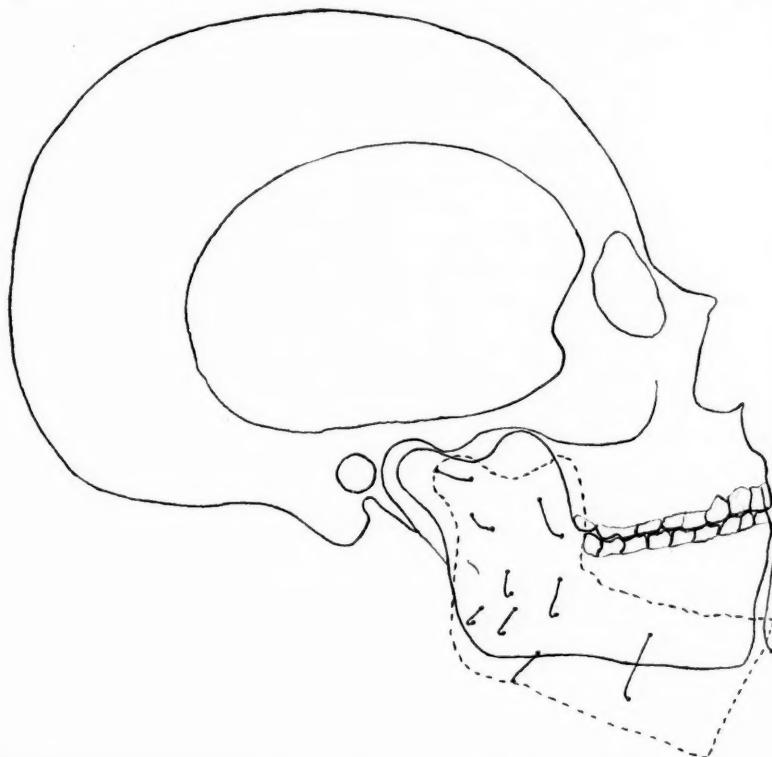


Fig. 9.—Drawing from photograph taken of model while mouth was being opened. Dotted line gives position of the mandible when wide open. Curved lines running between dots show actual path traversed by illuminated points fastened to the mandible. The axis of rotation is thus shown to be near the attachment of the stylomandibular ligament.

how? How much do joint structures and action change with the changing teeth? These and many other like questions suggest themselves. Certainly they are important, and as surely they are difficult to answer. Possibly this study may help in that direction.

In working and thinking over these matters, a few ideas along practical lines have come to me, and I hope I may be pardoned in my lack of familiarity with much of your work if I mention one thought that has been prompted by this study.

After having made wax impressions of the meniscus from both sides of more than fifty skulls with good dentition, and after having carefully examined them

as to their size and shape and relative thickness in different parts, I saw that no two were alike, and that the differences were considerable and rather remarkable. This variation among the menisci would mean that the closely related condyle, glenoid fossa and articular eminence in each case, differed as well. It would mean that the varying condyles under the pull of their external pterygoids (varying, too, in their direction of pull) would follow paths, differing in length, in direction and in their angle with the occlusal plane. In a very real sense, each of these condylar paths would be unique for its own jaw, that is, such a path would be found only in the person of its owner and in no one else. If the above is true, then it follows that each person has a unique pattern for the motion of the cusps of his teeth, unlike that of the cusps in any other jaw. If the motions of condyle and cusp differ from skull to skull, the muscles of each person's jaw carry on their action uniquely, too, varying in strength and direction of pull and more especially in their timing, to effect a proper synthesis or synergy in action of all muscles used. This is regulated by the central nervous system, whose customary action continued year after year has formed what we should call a habit. One might summarize these facts by saying that the "physiologic pattern" in the use of the jaw is unique for every person. Whenever any person chews he follows that pattern only.

If a foreign body comes to lie between any person's teeth, if one of his teeth is displaced or erupts into a place not fitted for it, if artificial teeth are introduced into a mouth where they are not perfectly adapted to the existing parts and their accustomed motion, his "physiologic pattern" will be embarrassed and unhappy strains will be developed with impairment of function and temper. The foreign body and the improperly placed tooth prevent proper occlusion; the unadapted denture will meet strains never felt by the teeth it replaces, and it will be pressed too strongly or rocked upon the soft tissues of the gums, and irritate them to a point where the denture becomes useless or inefficient for its purpose. The condylar path and the "physiologic pattern" of that patient do not agree with the new teeth nor their owner with their maker.

As the treatment for the foreign body is its removal, as that of the improperly placed tooth is its alteration or removal from its present situation in some way, so the treatment for such a denture, not built for the unique "physiologic pattern" of the patient, is—never to make it! Can this be done, or not done, with any assurance by the dentist? I do not know, but I think I do know that what the dentist wishes to learn is the exact path of the cusps of the teeth he is to supply. This means first that such cusp paths must be measurable and recordable in order successfully to replace the missing teeth. In the case of only a few missing teeth the problem is more simple, but in that of an edentulous person it surely is more difficult. This patient's jaw has been worked for, say, twenty-five to fifty years and has developed a definite "physiologic pattern" all its own. Will that pattern not continue for some time unaltered or little altered even without his teeth? If one can measure (with proper spacing of the jaws to make up for the lost teeth) the motion made by the jaw up and down, forward and backward, and sidewise, and record it, will not one have the pattern traced by that jaw before it became edentulous, if not too long

previously? Ought not such a set of measurements to give the answer as to the kind and disposition of teeth to place into that mouth? To make practically useful these recorded measurements would it be a difficult matter to construct a model upon which these motions could be reproduced exactly as in the patient's case, and upon which the new denture could be fashioned? Would not a unique denture so made fit this unique patient at the outset? Such a working model, upon which careful measurements could be imposed from any patient, would be useful, I should think, not only in such extreme cases as furnished by the edentulous patient but in many others in which the nice fit of the teeth is concerned. I believe that with the knowledge we have of the structure and function of the jaw and all its related parts such a model could well be made. I have seen an approximation of such a model already in existence. With it or something of the kind I wonder whether the prosthodontist could not approach his patient with more reasonable assurance of success at the first try even in very difficult cases, while I should suspect that the orthodontist would find such a mechanism, made on these sound principles, of great use to him.

There are certainly many other applications of a knowledge of the precise workings of the jaw which could be made, but I have perhaps ventured too far already and will content myself with what I have said. I hope that this outline of what the human jaw is and what it does, and how it does it, will stimulate others to develop that knowledge further, and I believe they will find it of practical importance in the ever growing profession of dentistry.

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MYOFUNCTIONAL THERAPY

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IT IS my purpose in the following paragraphs to discuss the subject of muscle function, or myofunctional therapy, in its relation to orthodontia. Before proceeding to the actual consideration of myofunctional therapy as a practical method of treatment, however, it will be necessary to recognize certain facts which are essential to the understanding of its theoretical and rational aspects. I propose, therefore, to review briefly some of the more important features having their basis in collateral science but having also a more or less direct bearing upon the subject.

PHYSIOLOGY

For more than one hundred years physiologists have sought to discover the properties of living muscle tissue. Thousands of laboratory experiments and microscopic examinations have produced a voluminous literature and revealed many important findings in this field. The microscope has disclosed the histologic structure of muscle and explained the reason for many of its properties. It is known, for example, that muscle tissue is comprised of hundreds of long nucleated fibers, each of which is covered with a tough glistening sheath (the sarcolemma). These fibers are bound into bundles, the coverings of which fuse with the outer sheath of the muscle itself to form the tendon. The tendons are attached at the origin and insertion either to a bone or to the integument of the skin or another muscle as in the case of some of the facial muscles. Each individual fiber communicates directly with the nervous system by means of a tiny nerve which terminates in an end-organ within the muscle fiber itself.

The capillaries do not pierce the sarcolemma but spread into a delicate network which surrounds and enmeshes the fibers, forming a system of permeable membrane through which an interchange of fuel and waste is constantly taking place by a process similar to osmosis. The lymph which surrounds these membranes plays an important part as an intermediary during this process and comprises a separate and somewhat slower circulation. Each one of these fibers with its nerve and blood supply is a distinct unit for the production of energy; and, when we consider that some muscles contain several hundred thousand of such units, we begin to realize the complexity of the tissue with which we are dealing.

CHEMISTRY

Much work has been done in the chemistry of muscle tissue in an effort to discover the actual process by which the potential or chemical energy contained in the blood is transformed into kinetic energy. It is known that complex compounds are split up by a process not unlike combustion, consuming quantities of blood sugar as well as oxygen. Analysis after violent exertion yields large

amounts of carbon dioxide and sareolactic acid which are considered as waste products, although they do have further uses in the body chemistry. The carbon dioxide returns to the lungs where it acts as a respiratory stimulant, while the sareolactic acid is thought to have a sedative effect upon nerve tissue.

The supply of oxygen is of vital importance to muscle action, and a shortage immediately results in rapid fatigue and impaired function. (This fact will be dealt with later in more detail.)

Sensitive galvanometers and thermocouples have been devised to measure the almost imperceptible amounts of electricity and heat which are generated during the process of muscle contraction. Such experiments have shown that the action is an electrochemical one of infinite complexity, during which each fiber becomes shorter and thicker, and by their united action exert force through the tendon to the movable part. When the stimulus is removed, the resiliency of the fibers causes them to resume their original shape; the products of fatigue are removed and recovery takes place.

Because of the large amounts of oxygen in the chemistry of muscle action, it was originally thought to be a process of oxidation. Present opinion seems opposed to this theory, although its exact nature is still unknown.

NEUROLOGY

I shall not attempt to describe the innervation of muscle in any detail. There are, however, certain facts pertaining to this phase which are so closely associated with this subject and which are so essential to a clear understanding of subsequent material that I shall outline them briefly.

It is customary to recognize two main divisions of the nervous system, the central portion consisting of the brain and spinal cord, and the peripheral portion including the cranial and spinal nerves. Our concern being mainly with nerve function, we shall divide it accordingly into the cerebrospinal or voluntary system and the autonomic or involuntary system.

If the course of one reflex arc is traced when a stimulus is applied to a sensitive area and a response is evoked in a skeletal muscle, it will illustrate one unit in the system which activates and controls the voluntary motion of the body. When a definite stimulus, for example heat or electricity, is applied to the skin, it is picked up by the receptors or organs of touch, and an impulse passes through afferent nerve fibers to the cell body in the spinal cord. Here the synapses, which correspond to miniature telephone exchanges, sort and relay the message by means of a complicated variable resistance mechanism to the proper centers in the cord or lower brain. Here it is picked up by efferent nerves and transmitted to an end-organ in a muscle fiber, causing a single contraction. This is the simplest form of reflex and one which seldom occurs singly in the body where many such responses are combined to cause coordinated movements by groups of muscles. The above illustration does not include movements which involve the will or the intellect. These purposeful activities call into action the higher brain centers which are connected by association fibers to the subcortical areas referred to in the illustration. The response thus evoked is called a phasic contraction, so named from its three phases, latent period, contraction, and recovery.

AUTONOMIC SYSTEM

We have been concerned up to this point with the cerebrospinal nerves and with voluntary or skeletal muscle. Since the muscles of mastication and facial expression are of this type, it might be supposed that this would be the only type which would be of interest to the orthodontist. In this connection it is well to remember that the mouth is associated with other functions besides those of mastication and speech which are controlled by the autonomic system and its components, the sympathetic and craniosacral. The digestive system and the respiratory system, both of which are controlled by involuntary muscles and autonomic nerves, have their orifices in the buccal cavity. The instinct to satisfy hunger, which is a reflex activity from birth, is intimately associated with the autonomic system. Perversions of this instinct and the sucking reflex are cited by Strang as among the more common causes of malocclusion. Although it is considered as a separate system with function and structure distinct from the somatic nerves; nevertheless the autonomic is actually a visceral extension of the cerebrospinal system and acts with it in an endless number of combined reflexes. As an example, an interoceptive stimulus in the stomach wall may send impulses through the sympathetic system to the brain where they are interpreted as hunger, but the response to this stimulus, i.e., the obtaining and eating of food, is executed by voluntary muscles. The regulation of other equally vital functions, such as the vasomotor control of blood supply as well as the control of the glands of internal secretions, is accomplished by means of the autonomic system. The center of the emotional life of the individual and many of the finer biologic adjustments which were formerly considered as the province of the intellect are located in this most intricate and delicately balanced mechanism.

I have attempted in the foregoing description to give a rather general picture of the mechanism of nerve control in order to stress the importance of both voluntary and involuntary systems in their relation to muscle function. It cannot be claimed that we are able to trace many obscure conditions to a definite source but merely to suggest the category in which they may be placed. Further work in this field may furnish a clue or possible solution for more of the obscure problems which confront the orthodontist, especially in those cases in which so-called muscle habits complicate the treatment. The evidence at hand would indicate that many of these conditions are the responses of mixed reflexes, the stimuli being interoceptive and involving structures not generally associated with organs of speech and mastication.

It is also well to point out the futility of purely mechanical treatment in matters so deeply rooted in the biological constitution.

TONICITY

Some skepticism has been expressed at various times regarding the effectiveness of myofunctional therapy in stimulating bone growth. These criticisms do not take into consideration certain qualities peculiar to muscles and their innervation which are used to distinct advantage in this form of treatment. Probably the most essential of these properties is the tonicity of muscle and its relation to function which is of such vital importance that we shall consider it in some detail.

Tonicity, as it is defined, is a state of mild contraction caused by a continual flow of efferent nerve impulses. A certain degree of tonicity is present in the muscles at all times, although it is at a very low ebb during anesthesia, sleep, and other lapses in consciousness. Variations in both bodily health and mental state are accurately reflected in corresponding changes in tone level. Temperature changes, emotional excitement, endocrine activity, fatigue, and exercise all have their influence upon the general tonus of both smooth and skeletal muscle. We recognize immediately the high tone level of the person who is refreshed and is in good physical and mental health by the firm grip, springy step, and confident expression. On the contrary, we say of the sick or discouraged individual that he is losing his grip.

Generally speaking, we have no direct voluntary control over the mechanism of muscle tone, a fact which is illustrated by a familiar experiment in physiology. Decerebrate animals when placed upright are able to stand unsupported except for the tone in the extensors of their limbs, proving that the impulses which produce the tone are wholly involuntary, since the cerebral hemispheres which contain all the centers of volition are removed. There is scarcely an activity of everyday life which is not reflected in the tone level of the muscles without conscious effort on the part of the individual.

PHYSIOLOGY OF PHASIC AND TONIC CONTRACTION

In the description of a muscle reflex in another paper, I referred to a phasic contraction. This is the voluntary or purposeful type of muscular activity and differs sharply from the type which I am now considering. In the living subject it is difficult to separate completely or to distinguish one from the other but for the sake of clarity I shall recognize two distinct types, the phasic and the tonic, and attempt to point out some of the points of difference.

It is only recently that physiologists have come to any agreement as to the behavior of the individual muscle fibers in contractions of varying degree and under stimuli of different intensity. Most authorities agree at present that the impulse in an individual nerve fiber is of the all-or-none variety, i.e., if a message passes through a single nerve fiber, it does so at full force or not at all. In other words, the intensity of impulse in a phasic contraction does not vary with the strength of the stimulus but remains constant for a given neuron. The force of the contraction does, however, vary with the number of fibers which are stimulated. When, for example, a very slight stimulus is applied, only a few fibers are affected and a mere twitch may result, whereas a violent stimulus will break through the synaptic resistance and whole groups of muscles will contract because more fibers are stimulated.

Tonic contractions are not of the variety just described but resemble more closely the organs of special sense in that they vary in direct ratio to the frequency of the impulse.

TONE HARMONY

The term tone was evidently adopted from a similar word used in the field of music to denote the frequency of surface vibration. Just as a musical instrument is tuned to a standard frequency of 440 vibrations per second, so the various muscles of the body are tuned to a frequency which is normal for the

individual. One might suppose that tone level in all muscles would be alike coming as it does from a central area in the cerebellum. This is not the case, however, as there is marked variation in the different groups according to the amount which they are used, as well as to other factors which have been mentioned previously. Exploring the analogy of music still further, we find that the correct combination of vibration frequencies produces tone patterns which are known as harmony. Likewise in the body properly balanced frequencies produce harmonious neuromuscular tone patterns which are manifested in proper posture, pleasing facial expression, and nicely coordinated function.

RELATION OF TONE TO FUNCTION

We have said that the control of muscle tone is involuntary, and this is true in the generally accepted sense. There is, however, one qualification which must be made to this statement and herein lies the essence of the rationale of myofunctional therapy. In addition to the two divisions of the nervous system which have been mentioned, there is a third division which must now claim our attention, since it is through this mechanism that the voluntary activity of myofunctional therapy is able to influence the involuntary function of tone. There are located in the tendons and joints, highly specialized nerve endings which are stimulated when the muscle or bone is in motion. These are the organs of kinesthetic or proprioceptive sense, which keep the individual conscious of his position in space, his rate of motion, balance, etc. Special afferent fibers pass from these end-organs to a section of the spinal cord known as Clark's column where they unite to form the "direct cerebellar tract." This tract or bundle of fibers passes directly to the cerebellum where they terminate in the centers of tone control. Conscious activity concentrated in certain muscle groups as in myofunctional therapy stimulates these tone centers and causes an increase in the frequency of the nerve impulse and consequent rise in tone level. Like most sequence of cause and effect the interaction of tone and function is circular in character and when once established tends to continue. It has been noted how increase in function raises tone level, and it is equally true that a high level of tonicity increases functional activity. The athlete, poised or set for a contest, has in his muscles an alertness and readiness for activity because of their well-toned or trained condition. It has also been observed that his muscles have increased their tone as a result of strenuous effort. Thus it is evident that the effect of muscle training does not end with the actual exercise period but continues in its stimulatory effect to create a capacity for the more vigorous use of the parts at all times.

COORDINATION

The ordinary acts of everyday living, such as eating, drinking, walking, etc., are, when analyzed, the results of very complicated movements of the various muscle groups which are so arranged that one group is balanced or antagonized by another. When at rest in a given posture or expression, each muscle involved is in a state of static contraction which supports the part and prevents its antagonist from taking full control. During motion, however, the mechanism of inhibition is brought into play. This relieves the individual of all conscious effort in releasing those muscles which are not needed and which would prevent the movement from being executed.

The discovery of this system was due to an experiment by Sherrington, the eminent English physiologist. Sherrington resected the flexor muscle in the leg of a decerebrate animal and applied a stimulus to the nerve of the same muscle. Although there was no attachment to the bone; nevertheless the limb was seen to contract as if the preparation were intact. He concluded that the contraction was due to the weight of the leg and the inhibiting impulse which was set up in the extensor muscles.

HYPERTONICITY

It is sometimes observed that certain of the facial muscles have acquired a stiffness or spasticity and appear to be hypertonic. This condition creates a lack of balance between the various groups and is evident in the facial expression as well as in changes in the dental arches which are caused by excessive pressure.

If these hypertonic conditions are solely the results of overactivity through an acquired habit, it would seem logical in view of the above facts to expect that an increased function in the antagonists would inhibit this excessive tone and correct the condition. There are, however, other factors which enter into the problem which make the cure of this condition much more difficult than would appear on the surface. Many children have personality problems which aggravate the condition and make cure impossible as long as they exist.

FUNCTION IN RELATION TO DEVELOPMENT AND FORM

As sufficient evidence has been adduced to show the vital importance of muscle tone in its relation to function, I shall incur the risk of discussing a point which is practically a truism by adding a few statements regarding the rôle of function in the development of bone.

Julius Wolf, who was professor of orthopedic surgery in the University of Berlin, was among the first to call attention to the plastic quality of bone, and its property of changing form when there was a change in function. He observed the changes both in external contour and in internal structure and believed that the faulty posture was responsible. Wolf did not believe as do modern authorities that muscles were the cause of deformities nor did he realize the part played by the osteoblasts and the osteoclasts. Much of his work was with deformities of the legs, and he attributed the changes to the weight of the body. Nevertheless, Wolf's law contained the fundamentals upon which orthodontia is founded, and its discovery was one of the greatest contributions to this science.

Numerous experiments have been performed in order to discover the influence of function upon the growth and development of the jaws. Walkhoff and Anthony dissected the temporal muscle on one side of the jaws of young dogs and noted marked asymmetry of the whole skull as well as of the jaws. Lansberger and Baker extracted teeth on one side in animals shortly after birth with similar results; and, although some critics believe that some of the variation was due to loss of structure, some of it was undoubtedly due to loss of function.

Even the most ardent exponents of myofunctional therapy as an adjunct in treatment of dental anomalies do not believe that function is the sole influence

in the development of the facial bones. The experiments of a group of English physiologists are pertinent to this question and illustrate the presence of other factors to be considered. These workers prepared an embryo chick femur in culture media under conditions which were intended to simulate the body. All mesenchyma was removed to insure the exclusion of all influences except actual bone cell activity. These embryonic cells were observed to differentiate into bone and to assume characteristic form of a femur under normal conditions with diaphysis and epiphysis of typical shape, but considerably smaller. The various contours and internal architecture were somewhat rudimentary, and the structure was rather hypoplastic. These experiments prove that the primary factor in bone growth and development is an intelligence or memory which is inherent in the cells and which causes them to assume typical form without any assistance from functional activity. The contribution of function appears to be the ability to attain normal size and contour rather than typical form. This is seen in cases of hemiplegia, ankylosis, and other conditions in which only one side is affected.

FUNCTION AND BLOOD SUPPLY

When we speak of the influence of function upon form, we usually think of the actual mechanical pressure or pull exerted upon the bone by the muscle either in static contraction or in actual motion. Of almost equal importance is the part played by function in the maintenance of blood supply. The action of muscle fibers is likened to tiny pumps which act as impellors to quicken the flow of blood in the muscles and surrounding tissues. This action as well as the stimulating effect upon the vasomotor nerves increases the blood supply as much as five times during exercise and brings added nutriment, a greater diffusion of oxygen, and a more rapid elimination of waste products.

This phase has not been thoroughly explored nor is it supported by much experimental evidence. It is, however, logical to assume, since the circulation of bone and muscle is so closely allied, that a normal blood supply would have a beneficial effect upon the metabolism and growth of the facial bones as it does to every other vital process of the body.

INDICATION AND SYMPTOMS

With very few exceptions, myofunctional therapy may be used in all cases of orthodontia at some stage of the treatment with beneficial results. Weak or hypotonic muscles are easily recognized by the general appearance and their behavior during function. Those of the masticating group are thin and flattened until in extreme cases they can scarcely be felt when in full contraction, while certain muscles of expression are so slackened through lack of tone that the overlying skin appears to sag. This is particularly true of the muscles of the cheek and those of the suprathyroid group.

Lack of proper tone in the orbicularis oris is manifest in a variety of forms depending upon the curvature of the arches, the amount of protraction or retraction of the incisors, the degree of overbite and overjet. Because the orbicularis oris is plastic and circular in form and impossible to elongate, it assumes whatever form is determined by the underlying structures and the force of the muscles which insert into it. One type may curl away from the maxillary incisors

giving the appearance of a short upper lip and exposing the gum tissue, while others droop at the corners due partly to lack of support from the levator anguli oris, risorius, etc. A third type is the loose and thickened lip muscle which appears to be overdevelopment but which is actually caused by a lack of tone and a relaxation of the fibers.

It is not my purpose to give a detailed explanation of all the phases of myofunctional therapy but to cite one or two examples which will serve to illustrate the application of the principles of the method.

Let us consider, for example, a typical case of distoclusion with deep overbite in which there is a marked lack of vertical growth in the bicuspid and molar region. The muscles of mastication are usually much underdeveloped in these cases owing to occlusal interferences which prevent them from functioning in their normal direction. The masseter muscle which should exert a forward and upward pull is weak and poorly coordinated when the jaws are placed in their normal relation. Tone level in the pterygoids, especially the external pterygoids, is very low, as will be seen if the patient is requested to protrude the mandible or open the mouth against resistance. The muscles of expression are generally weak and of poor tone, and usually present an exaggerated genio-labial sulcus. This is a common type of distoclusion; and, although myofunctional therapy may be used in all cases, this variety is particularly well adapted to treatment by very simple appliances and the use of exercise.

During the initial stages of treatment while the arches are being developed to a proper form, exercises may be prescribed to develop the external pterygoids and the patient instructed in the proper position of the mandible. The orbicularis oris is given general tonic exercises, thereby improving the tone in all the facial muscles which insert into its fibers at various points. It is most important to defer any active exercise of the "power group," i.e., the masseter, the temporal and internal pterygoids, until the arches are developed to a point where the cusps may be placed in a position of mechanical advantage. When this point has been reached, a bite plane is inserted which guides the mandible to its normal mesiodistal position, and the vertical growth in the molar and bicuspid region takes place in gradual stages under the influence of the masseter temporal exercise which is prescribed at this time. The quickest and most satisfactory results are obtained if this step of the treatment is instituted at a period when there is active vertical growth in the posterior region, since this is an important factor in the correction and retention of distoclusion.

Myofunctional therapy is a most useful adjunct in the treatment of meso-clusion cases both in the active and in the retention periods. It is well known that cases of this type should be treated at the earliest possible age, since the condition is aggravated and tends to become progressively worse through continued functioning in the malposition. The temporal muscles are especially weak in this type of malocclusion, having been stretched beyond normal limits, and are unable to resist the forces of occlusion.

No attempt is made to strengthen the muscles of mastication until the mandibular protraction is reduced and the incisors are in their correct relation, as their weakness is an advantage at this period. After the mandible has

been retracted to a position of mechanical advantage, myofunctional therapy with special attention to the temporal muscles is employed to establish an overbite which is so necessary to a permanent correction in this class of case.

There are many other conditions in which muscle training is valuable either to supplement mechanical treatment or to use without appliances as in transitional periods and during vacations. The reader is referred to the writings of Dr. Alfred P. Rogers for detailed description of the various exercises. These exercises are very simple in order to avoid confusion to young children and are comprehensive enough to include a large proportion of cases to be met with in practice.

SUMMARY

My object in the preceding pages has been:

1. To give a brief description of the structures involved and to mention some of the more important points regarding their physiology, and especially to explain the functions of the cerebrospinal system, the autonomic system, and the direct cerebellar tract as related to myofunctional therapy.
2. To differentiate between tonic and phasic contractions in muscle function.
3. To explain the manner in which myofunctional therapy stimulates a flow of impulses in the tone centers through the kinesthetic mechanism, thus forming a liaison between conscious effort and the involuntary functions of the cerebellum.
4. To stress the importance of establishing a normal muscle tone and the interdependence of tone and function.
5. To emphasize the fact that myofunctional therapy is largely a matter of nerve training although reflected in muscular patterns.
6. To recall the relation between form and function from the standpoint of mechanical stimulation, as well as the increase in circulation with its added nutriment and effect on metabolism.
7. Finally, to illustrate the practical application of myofunctional therapy in the treatment of cases.

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POSSIBILITIES AND LIMITATIONS IN THE TREATMENT OF CLOSED-BITES

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OF ALL conditions which the dentist encounters, probably the least understood and the most difficult to treat successfully is the closed-bite. What constitutes a closed-bite? Why do dentists seek to change this condition? The term "closed-bite" in itself is confusing. If a large group of dentists were asked to define a closed-bite, probably no two dentists would give the same definition. This is a controversial subject. Discussion of this problem is as old as dentistry, but, to my knowledge, no thorough analysis of the problem has ever been made. In this paper I shall present an analysis of closed-bites which, if not entirely comprehensive, may at least lay a foundation for a more complete classification and lead to a better understanding of the problem.

There are two types of closed-bites. I shall describe only typical conditions and not variations. The first is the true closed-bite. In this condition the teeth are short and broad, thus making the distance between the mandible and maxilla unusually short. As a result, the distance between the point of the nose and the point of the chin is so short that it differs quite noticeably from the type of face which is generally looked upon as ideal. The musculature is usually very heavy. There is generally an unusual prominence of the lips with a deep curl between the nose and the upper lip and the chin and lower lip.

The second condition is commonly called a closed-bite but it is really a deep overbite. A typical picture shows posterior teeth which are long with deep cusps and an exaggeration of the curve of Spee as the result of an apparent overeruption of the lower anterior teeth. In most cases, the mandibular teeth bite so far under the maxillary teeth that they are hardly visible.

In the true closed-bite the departure from the average is reflected in the posterior teeth, that is, in the premolars and molars, while in the deep overbite, the discrepancy occurs in the anterior teeth. An analysis of the tissues of the oral cavity, their structure, their function, and their relationship to each other is necessary in order to understand the closed-bite problem. I shall make such an analysis and follow it with a detailed description of the true closed-bite and of the deep overbite in both the developmental and in the adult periods. We shall discuss the reason men seek to change these conditions, the methods whereby they try to change them, and the reasons for success or failure.

The oral cavity is made up of muscles, bones, tendons, ligaments, nerves, blood vessels, and teeth. Let us consider briefly the osseous structure. Bone, while hard, is the most plastic of the body tissues. It changes as the result

of stimulation, but the statement frequently made, that bone is built in response to mechanical stimulation, is misleading. Bone is built as the result of growth. Stimulation can affect the direction of growth, but it cannot produce growth. Growth, whether of bone or any tissue, is an intrinsic property of the organism. Bone is constantly going through a tearing-down and rebuilding cycle. It grows in this way and repairs in this way. It has great power of repair, but there is a limit to the changes which can be made in bone.

The alveolar process is a specialized form of osseous tissue. It is the transitional bone which is superimposed upon the true bone. One cannot tell where the true bone stops and the alveolar process begins; they seem to be one bone. The alveolar process begins to form when the roots of the deciduous teeth are in the process of formation, and it continues to develop until all of the deciduous teeth are fully formed and have erupted. It remains in that condition until the roots of the deciduous teeth begin to be resorbed. Then the alveolar process and the roots of the deciduous teeth are resorbed simultaneously. When the deciduous teeth have been exfoliated, none of the alveolar process which supported them remains. An entirely new alveolar process develops with the permanent teeth. Its proportions are determined by the length of the roots of the teeth of the permanent dentition, and its growth parallels that of the teeth. In short, there are two distinct alveolar processes, one for the deciduous teeth and one for the permanent teeth.

The form and structure of the alveolar process are the same as those of any other bone. We find, clinically, that the alveolar process differs in function from other bones in that it is purely a tooth-bearing and tooth-supporting structure. It further differs from other bones in that it has no direct muscular attachments. It is influenced by muscle only so far as the muscles of mastication exert pressure upon the teeth and, through them, upon the alveolar process. Many facial deformities can be traced to this tooth-bearing structure because the teeth can occupy only the positions to which the alveolar process, in its development, carries them.

Let us consider the muscular structure. A muscle is composed of fibers, each with its own nerve and blood supply. These fibers have the dual function of contraction and relaxation. Muscles taper into tendons by which they are attached to bones. Tendons and ligaments are slightly elastic but have no power to contract and relax, and they have only slight power of repair or change. Muscles have no elasticity but have the property of contraction and relaxation. Muscles work in groups or pairs. When one of a pair of muscles contracts and shortens, its opposing muscle relaxes and elongates.

Nothing known to science except accident, disease, or surgery can increase the length of muscle after it has reached the fullness of its growth. If muscles could be lengthened, men could be made taller, arms could be lengthened, and one leg could be made longer than the other. Muscles are always dominant over bone; my whole paper is based upon this fact. To quote from William Collin Mackenzie, "It is the length, size, and 'tonicity' of the muscle that maintains the normal length and size of the bones, and not the reverse, as is so often and erroneously taught." Bone is the passive

organ; muscle, the active organ. As correlation in growth takes place, the adaptive change is always in bone, never in muscle.

In our discussion of closed-bites, we are concerned with the portion of the face between the orbit and the lower border of the mandible. This includes the oral cavity. It is made up of the two maxillary bones and the mandible, the one movable bone of the head. The mandible is suspended from the base of the skull by the ligaments of the temporomandibular joint and by groups and pairs of muscles of mastication. The teeth are located in the alveolar process which is superimposed upon the mandible and maxilla. The soft tissues, composed largely of muscles, are superimposed upon the bones.

The tissues of the oral cavity are interrelated in structural development and in function. The size, the shape, and the form of the teeth are established very early in the development of the organism. Once established, their form is never changed. This indicates that in the germ cell there is not only the potentiality of development but also a plan of development which evolves with the organism until maturity. Just as the teeth are formed very early in the history of the organism, so the osseous and muscular structures of the oral cavity are formed and develop in harmony with the type of teeth. The teeth cannot change and the osseous and muscular structures, through nature's plan of correlation in growth, adapt to them.

The practitioner's purpose in trying to treat a true closed-bite is the establishment of a more symmetrical facial development. He realizes that the distance from the nose to the point of the chin, as reflected through the muscles, is out of harmony with the generally accepted concept of the ideal face, although function is undisturbed. In a deep overbite the appearance is normal, but treatment is instituted because the patient experiences discomfort and faces the prospect of future oral disease.

Closed-bites must be considered in two periods, the developmental period and the adult period. There is a vast difference in the closed-bites of these two periods. The developing stage is the orthodontic period, while the adult stage may be a problem for the orthodontist, the prosthodontist, or the general practitioner.

The developmental period is characterized by growth. Thomas L. Stedman defines growth as "the increase in size of a living being or any of its parts occurring in the process of development." As the deciduous teeth lengthen in the process of growth, the rami of the mandible increase in size as fast as the erupting teeth require and the developing muscles permit. This is a synchronized process which continues throughout the developmental period. The muscles are always the dominant tissue in every stage of growth.

While growth goes on constantly until maturity, there are several different periods during which marked changes occur as the result of growth. One of the outstanding stages in the developmental process is the period during which the four first permanent molars develop and erupt almost simultaneously. At about the same time, the four lower and four upper incisors erupt. At this period an apparent close-bite may become evident.

The next important growth period comes when the second molars erupt and the premolars and canines replace the deciduous teeth. It is growth which produces this change, and the adaptation of the increase in bulk is a natural growth process. Harmony of growth and development exist in the size, the shape, and the form of the teeth, the alveolar process, the osseous structure of the mandible and the maxilla and the muscles which are in control. Inasmuch as growth produces constant changes during the developmental period, men should guard against believing that all departures from the ideal are deformities. They are often only stages in development. Who can say definitely that the close-bite at the age of twelve years will be a close-bite at twenty years? While we recognize that there is a plan of growth, we cannot accurately predict it. So long as the muscles grow, any apparent closed-bite will continue to correct itself. When the muscles stop growing, nothing can correct a true closed-bite. Therefore, how can any one feel justified in treating a closed-bite during the developmental period when the condition may be only a stage in growth?

But what of the true closed-bite after maturity? In the true closed-bite, the posterior teeth are short, the rami are short and the maxillomandibular muscles are correspondingly short and in harmony with the rest of the organism. As in all types of occlusion, when the muscles controlling the mandible are passive, there is a slight space between the upper and lower posterior teeth. The jaws do not close tightly when the muscles are in equilibrium. If they did, the bone supporting the teeth would resorb under this pressure. Nature will not tolerate a strain which can be eliminated by an adaptation of the parts involved.

Many of the profession have not taken these facts into consideration. They have tried to improve facial contours by opening the bite. Let any one undertake consciously to hold the mandible for any length of time in any but the passive position and learn how tired the muscles become. Regardless of the direction in which the mandible is moved by one group of muscles, there is a corresponding group ready to pull it back to its passive position. This is an important fact to be kept in mind by those who believe they can correct a true closed-bite by changing the temporomandibular joint. There is no bone in the body capable of so great a variety of movements as the mandible. If a change were made in this joint, changes would have to be made in the ligaments, the tendons, and all the muscles and their attachments. If the muscles which close the jaw could be lengthened, would not the muscles which open the jaw have to be correspondingly shortened? If this were not done, there would be a point at which the mandible would be entirely out of muscular control.

The realization of the dominance of the muscles and the consequent impossibility of opening a true closed-bite did not come to me without some trying experiences. I remember that in my early years in general practice, a patient with a true closed-bite came to me for partial dentures. He had lost three mandibular posterior teeth on the left and right sides. The edges of the mandibular teeth were so sharp that they were cutting the tongue and the mouth closed so far that the lower incisors could not be seen. I fitted

the spaces with bridges. The bite was opened to such an extent that the edges of the mandibular incisors barely touched the edges of the maxillary incisors. At that time I felt that I had accomplished a wonderful piece of work, and it was—*while it lasted!* In a comparatively short time the patient returned with the bite as close as ever. A heavy piece of metal was swaged and fastened to the occlusal surfaces of the bridges, and the bite was opened again to the same extent as at first; but, again, the patient returned in a short time with the bite closed just as it had been at the beginning. I realized that it was impossible for the anterior teeth to become elongated; in fact, in relation to the lip, they were just where they had been when I started. This is what had happened. The teeth supporting the bridge had received sufficient pressure stimulation from the pull of the muscles to cause them to depress into the alveoli. In our discussion of the tissues of the oral cavity, the dominance of muscle over bone was emphasized. It is this relationship which makes treatment of a true closed-bite impossible.

We see another instance of the dominance of muscle over bone if the tongue be held between the anterior teeth. The anterior teeth depress into the alveoli so that the tongue may be held between the incisors without placing a strain upon the muscles of mastication. This condition is commonly spoken of as an "open-bite," but, as a matter of fact, the bite is normal in the molar and premolar regions, in relation to the muscles, but the anterior teeth have been depressed by the pull of the muscles of mastication against the bulk of the tongue.

To sum up our conclusions regarding the true closed-bite, let us remember that, if the closed-bite is only a stage in growth, normal growth processes will correct it. If it is a step in the development of a true closed-bite, no treatment during development will prevent the ultimate result inasmuch as you cannot make the muscles grow beyond their predetermined limit. There is nothing known to science which will correct a true closed-bite either during development or after maturity.

Up to this point the discussion seems to have pointed out only that which *cannot* be accomplished. But is it not well to know our limitations? In the past men have tried to change the face to its most harmonious proportions with no thought of the limitations imposed by the form and function of the organism with which they dealt. If we realize our limitations we are in a position to advise patients wisely and spare them treatment which can only end in disappointment.

While the true closed-bite cannot be opened, the deep overbite, often erroneously referred to as a closed-bite, *is* amenable to treatment. It can be treated successfully because the muscles are not involved. In this condition we deal with the *osseous structure* which *can be changed*. In the deep overbite, the posterior teeth are in a relationship seen in the average mouth, but the lower anterior teeth have apparently overerupted to such an extent that the curve of Spee is exaggerated. The lower anterior teeth often bite into the soft tissues behind the upper anterior teeth and cause pain and injury to the tissues. Function is impaired, the mouth is not normal even for the

individual, and treatment is indicated. I have observed clinically that, if treatment is instituted *before* maturity, it will frequently have to be repeated, while, if it be done *after* growth is completed, the correction almost invariably remains. Permanency in orthodontic treatment is only possible after active growth is completed.

One of the methods employed in an effort to treat this condition is the insertion of a bite plate between the anterior teeth with the thought that, if the posterior teeth are held apart a sufficient length of time, they will elongate. The literature contains the statement that, if the molars and premolars are held apart a sufficient length of time, after they have elongated, to allow bone to be built around them, they will *remain* in that position. How fallacious this statement becomes in the light of our understanding of the relationship of muscle, bone, and teeth! Elongation of the posterior teeth throws a constant strain upon the muscles of mastication and destroys the interrelated harmony of parts. The pull of the muscles of mastication drives the teeth back into the alveoli until a slight space is present between the upper and lower teeth when the muscles are in equilibrium.

The only permanent change which can be brought about by the use of a bite plate is the depression of the anterior teeth into the alveoli. All change is a physiologic process, and no change will remain unless it be in conformity with physiologic laws. The only treatment which I have found successful in the treatment of this condition is the depressing of the lower anterior teeth. When pressure is applied to their occlusal edge, they depress into the alveoli in much the same natural way as when the tongue is held between the teeth.

In short, a deep overbite can be corrected because the corrective change is made in the bony process, the plastic medium. A true closed-bite cannot be corrected because muscle, the tissue which causes the condition, cannot be changed.

In order to avoid confusion, I shall describe another condition which is seen only in the adult. Through extraction of certain teeth or through a wearing-down of the occlusal surfaces, with resultant shortening of the teeth, a condition closely resembling a true closed-bite will result. This is primarily a prosthetic problem. As I stated above, when the maxillomandibular muscles are in a state of equilibrium, there is a slight space between the posterior teeth so that there may be no muscular tension or strain. What occurs in cases in which the occlusal surfaces of the teeth have worn down? It is my belief that the space is in proportion to the extent to which the occlusal surfaces of the teeth are worn down, but there has been no change in the length of the muscles. This shortening of the posterior teeth through wear may not be apparent except during mastication when the jaws are brought together with the resultant pouching out of the lips.

The problem of the length of the maxillomandibular muscles arises when artificial teeth are to be supplied by the prosthodontist. If prosthodontia were purely a problem of mechanics, the operator's task would be comparatively easy; but the complex physiologic factors which enter into this field of dentistry make it a most difficult one. All the measurements, statistics and

rules which have been compiled for the purpose of determining the length of the bite are valueless because there can be no standard when the length of the muscles of mastication bears a different relation to the other proportions of the head in every individual. The prosthodontist must determine the length of posterior teeth which will be in conformity with the length of the patient's muscles of mastication. Failure to do this will cause him endless confusion and disappointment.

A prosthodontist may make a denture for a patient who has been without posterior teeth for a long time. The patient may have many of the appearances of a closed-bite. When the dentures are inserted, the bite returns to its former position; the patient is comfortable and the face symmetrical. The reason for the satisfactory restoration is the fact that there had never been a closed-bite except an adaptive one during mastication in compensation for the loss of teeth and alveolar process.

The same dentist, encouraged by this success, may try the same operation in another mouth with only discomfort for the patient and failure for him. The reason? In this case, the muscles of the jaws are short, but the prosthodontist, ignoring this fact, tried to make the face over according to his concept of normal, by inserting long teeth in order to open the bite.

I may be in error, but it seems to me that many men fail to take these important facts into consideration. They try to improve facial appearance by opening the bite without realizing the changes which would have to occur in the facial tissues in order to accomplish the result for which they aim. As Dr. E. Howell Smith, of Philadelphia, has pointed out, restoration of the bite is possible but opening of the bite is impossible.

The muscles of mastication can tolerate without strain only a certain bulk between mandible and maxilla. If artificial teeth which exert any strain upon the muscles be inserted, the patient experiences an indescribable discomfort until the bone beneath them resorbs and the muscles are relieved of all stress. Muscle strain places a serious burden upon the nervous system. All of us have seen the injurious nervous effects of eyestrain or fallen arches. If abnormally long teeth be inserted, the patient is likely to experience considerable nervous irritability and fatigue until nature eliminates this irritation through accommodation of the parts, that is, through resorption of the alveolus.

In the true closed-bite, function is satisfactory, and the only reason efforts are made to open closed-bites is the belief that the appearance can be improved. Many men believe they can restore the face to normality. But who can select any one condition and say, "That is normal"? *Normal* is a fiction. There is one normal for each individual, and there may not be another person in the world in whom the same interrelation of parts exists. The artist may give us certain proportions and relations of the human body which are *ideal* from his viewpoint because they please the eye and are esthetically correct and symmetrical. But that is not normal for every one. The prosthodontist cannot work toward this ideal in a face which has been established by nature in *asymmetrical* proportions.

The statistician may gather figures and measurements and determine the condition which prevails, but that is an *average*, not the normal. Normal is individual and depends upon the correlation of parts in function. If the muscles are short, the osseous structure and teeth will be in conformity with the length of the muscle although these muscles may be out of symmetrical proportion with the rest of the face. This condition is just as normal for such a person as is the magnificent occlusion for "Old Glory," the beautiful skull found in all orthodontic textbooks as an illustration of normal occlusion.

The fine correlation and adaptation of parts which nature presents in the individual normal is so wonderful that I am amazed that so many men of science persist in measuring all objects by the same yardstick, their artificial, arbitrary "normal." If the short-toothed person, through a harmony of parts, has a closed-bite, can we, by any process, change it from its normal to an abnormal condition, even though the change would make the person more attractive looking, and expect it to remain?

In the deep overbite, the condition is not normal, even for the individual, because "normal" includes both structure and function and, in this condition, function is definitely impaired due to an apparent overeruption of the lower anterior teeth. The fact that the correction remains, if it be done after the active growth period, is evidence that a normal relationship has been brought about where an abnormal one existed.

This discussion has been presented from the viewpoint of a clinician with an appreciation of biology, physiology, and biochemistry. In all dentistry and in orthodontia, especially, changes have been too largely attributed to mechanical forces. For instance, teaching in the past gave a purely mechanistic explanation of the loss of the deciduous teeth. We were told that their roots were caused to resorb by the pressure of the oncoming second teeth beneath them. Today, we view this process as part of nature's program in the development of the individual.

Changes in tooth positions have been attributed to some form of mechanics. Beliefs such as these have created confusion in the minds of dentists. The fact is that change results, not from mechanics, but from biochemical growth processes. Growth goes on whether or not there has been artificial stimulation through mechanical intervention because growth is an inherent attribute of the organism. Artificial stimulation can only influence the direction of growth.

Development is a series of correlated events which constantly modify the interrelated tissues as the result of growth processes. Development of one part depends upon the development of another part and the whole elaborate process is well synchronized. This harmonious interrelation of parts, in both form and function, produces the individual normal. The individual normal is reflected in the true closed-bite. Change cannot be made because the dominant tissue, muscle, is in perfect functional harmony with the rest of the organism. In the deep overbite, change can be made because the defect is in the osseous structure of the lower anterior teeth. That is the one part

of the organism which is out of harmony in function. It requires correction because function is impaired, and it can be corrected because the correction does not oppose the individual normal as seen in the interrelation of teeth and muscular and bony structures. We are only agents who are permitted to restore the individual normal, not substitute our idea of normal in place of nature's concept.

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1520 SPRUCE STREET

ORTHODONTIC TREATMENT OF CLEFT PALATE

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THE history of cleft palate in the human race extends back many years. Galen in the second century referred to the subject.

Pierre Franco (c. 1500), a contemporary of Paré, in 1556 for the first time made references by which he meant "congenital split lip" and "hare teeth."

Sharp in 1739 mentions in his work, published in that year, "It is not uncommon for the roof of the mouth to be fissured."

Robert reported in 1776 that M. le Monnier, a skillful dentist, had successfully closed a complete cleft of the palate.

In 1883 Eustache, of Beziers, described an operation that could be applied in cases of congenital split of the velum.

In 1816 von Graefe, the celebrated German surgeon, the founder of modern plastic surgery, introduced to the medical profession the first comprehensive surgical method for closing clefts of the velum.

In 1827 the operation for cleft palate in America was performed by A. H. Stevens of New York.

In 1843 J. M. Warren of Boston did a successful uranoplasty.

In 1861 von Langenbeck suggested the dissection of the mucoperiosteum from the underlying bone, in repairing cleft palate. His method in use even today was advocated and advised by Baizeau, Billroth, Fields, Warren, Sédillot, and Wolff.

In the human embryo, Dorrance states, "the first branchial arches give rise to the mandibular processes, one on each side of the body. These proceed forward and fuse in the midline to form the mandibular arch which bounds the stomodeum or primitive mouth. The maxillary processes appear at about the end of the fourth week of intra uterine life as budlike projections from the upper aspect of the mandibular arch. They proceed forward to meet the lateral nasal element of the descending frontonasal process with which they fuse at about the sixth week of intra uterine life to form the anterior nares."

"Further anterior growth culminates in fusion of this process, at about the seventh week, to form the palate. Failure of this union will produce splits of the jaw which may be unilateral or bilateral with projections of the premaxillary bones. Arrest of development of any point behind the alveolar ridge determines the extent of split of the palate."

"In split palate, the premaxillary bones of man are formed by the two globular elements of the frontonasal process. These elements supply that portion of the palate anterior to the incisive fossa and mesial to the canine teeth. The split in unilateral cleft palate runs between the canine and second

incisor. The first maxillary incisor is borne by the globular process, while the latter may be attached to it or cast into the split. This explains the erratic position assumed by the second maxillary incisor in this case. The rudimentary canine, or pre-canine sometimes seen external to the cleft and mesial to the canine in certain cases of jaw splits is a supernumerary tooth."

In a study of the normal palate, we find it a structure which acts as a partition between the oral and the nasal cavities. The palate consists of an anterior portion known as the hard or immovable palate and a posterior part which is movable and known as the soft palate, or velum. The velum from the standpoint of function is divided into two parts, an anterior horizontal portion made up essentially of muscle tissue, and a posterior vertical portion which hangs down from the former. At rest, the uvula hangs down as a curtain; as it contracts and ascends slightly on velopharyngeal closure, it makes the vertical and dependent portion of the velum shorter. This causes the velar segment to become broader and thicker at the site of insertion of the levators.

The elevation of the pharynx brings these muscles into proper position, enabling them to close the passage between the oral and the nasal portions of the pharynx. To recapitulate: The elevator muscles of the pharynx pull the relaxed muscles upward and forward, while the lateral walls approach the midline. The velum is brought upward and backward by contraction of the levator palati muscles. The pterygopharyngeal portion of the superior constrictor muscles, by contraction, causes the sphincteric closure of the nasopharynx.

The importance of the above is to be kept in mind in corrective measures by surgery or artificial restorations designed to obtain a closure between the oral and nasal pharynx.

The congenital cleft may be of any degree from a slight notch in the lip or uvula to a complete nonunion of the lip, alveolar process, hard and soft palate and uvula, and may be unilateral or bilateral.

A faulty dentition is often associated with the above condition. Supernumerary teeth, congenital absence of teeth, malformed and malposed teeth, and a very much contracted and distorted arch, are primarily dependent on the degree and type of palate cleft and secondarily on the type of operation performed.

Supernumerary teeth are more often seen in the incisor and canine regions. Most commonly these supernumerary teeth are found on the lingual border coming through the horizontal plate of the hard palate; at times they are found buccally and sometimes even actually in the nostril.

These teeth are usually well formed, but sometimes, though of normal size and shape, they are soft and of the consistency and appearance of a bud.

When teeth are congenitally absent, unless the buds have been interfered with during operative correction, it is usually in the region of the lateral incisors; very often, however, the premolars are absent also.

Another very important deformity of the arch is the result of scarring and pulling from contraction of scar following surgical correction, and this has a tendency to contract the arch laterally. This is well seen when the pre-

maxilla has been erroneously removed at operation in bilateral cases and the palate repaired posteriorly; here we find no semblance of occlusion but the lateral parts are dragged in by the scar so that the canines, if present, almost meet in the midline of the palate.

This pull from scar tissue is of extreme importance to the orthodontist. It is this condition which he must constantly strive to overcome, and which accounts for the failure of so many cases of cleft palate to remain corrected without retaining appliances in conjunction with restoration of missing parts. In other words, there is a loss of the bony arch of the palate to act as a brace, and persistent mesial pull from scar tissue following repair tends gradually to narrow the arch.

Hence, the chief problem for the orthodontist is not only to correct alignment of misplaced individual teeth, but constantly to expand the arch, starting at a very early age and aid nature's plan to attain as near a normal development of the parts as possible.

As yet, the causes advanced for the failure of the cleft closure are very uncertain and, for the most part, are mere hypotheses. It is almost impossible to obtain experimental evidence for or against any theory, as far as the human embryo is concerned. We can experiment only with the lower forms of animals, and by comparing the results here obtained with certain analogous conditions of the malformations in the human being, formulate our conclusions. We can be positive of only one fact—the cause, or causes, underlying the failure of palatal closure must operate before the ninth week of fetal development, because by that time the palate, normally, has been closed by the fusion of the maxillary processes on each side with the corresponding lateral and medial nasal processes.

Fitz-Gibbon states: "The several theories which have been advanced as causes of cleft palate fall into one of two main classes—*intrinsic*, or *extrinsic*. There are those who hold that the germinal, or hereditary factor, is the most potent in determining the normality, or abnormality, of any given individual. One of the oldest theories offered as an *extrinsic* cause, which has been handed down, and the one most commonly accepted by the people with little, or no scientific knowledge is that malformation is due to impressions upon the maternal senses during pregnancy. Such impressions, however, can have little bearing upon the subject, for in most cases, the normal time for the closure of the palate antedates the reception of the supposed impression."

"The fact that this particular malformation occurs most often among the poorer classes, whose hygienic surroundings are least desirable, naturally leads to the inference that malnutrition may be one of the factors causing cleft palate. On the other hand, however, cleft palate is rarely known to have occurred in the Negro, whose general material environment is not superior to that of the white man. Nevertheless, it seems plausible to suppose that malnutrition may be one of the factors influencing the arrest of normal development.

"It is possible that the cleft may be influenced by injury or disease. Biondi suggests that the atrophy of the edges of the cleft, the result of in-

flammation, may hinder closure of the cleft, and some authorities accept syphilis as one of the causes of this inflammation. Also, a pathological condition of the uterus itself, may prevent normal development. Moll, in his study of the products of early abortions, found many malformations and arrested developments which he attributed to intrauterine injuries and infections" (Blair).

T. W. Brophy, in his writings states: "The definition generally given for cleft palate is: 'A congenital deformity, characterized by a fissure or fissures of the palate due to arrested development.' From the foregoing, we find the opinions expressed are that congenital cleft palate is the result of incomplete development of the tissues necessary to enter into its normal formation. The opinions of authors thus expressed have been based, no doubt, on their observation of the open space between the oral and nasal cavities. The error might easily be accounted for since the open space suggests an absence of tissue. The deformity, the statements of many authors to the contrary notwithstanding, is not the result of congenital deficiencies of the parts in question, nor arrested growth of the palate. All children who have congenital cleft palate, with rare exceptions, have in the palate at birth the normal amount of tissue. The palatal plates, however, are misplaced upward and ununited in the middle line. The palate is cleft. Later in life the tissues may atrophy for want of use. Therefore, a cleft palate is a fissure, a non-union of well-developed parts, not, with rare exceptions the result of arrested development nor failure of a normal quantity of tissue to enter into its structure."

Based on the above, Brophy advocated forced compression of the separated maxillae in lip-jaw-palate splits for closing the cleft in the bony palate. Brophy justified himself in performing this operation at this tender age on the hypothesis that the bone at birth contains one half organic matter and that the upper jaw broadens in cleft palate to the extent of the width of the cleft.

G. M. Dorrance, on the other hand, states that Brophy was laboring under an impression that a split palate is a separation of well-developed parts, and not a failure of the normal quantity of tissue to enter into its structure.

Much of the work of the orthodontist in cleft palate cases consists in correcting the dental irregularities and underdevelopment of the maxilla resulting from these early bone operations. Very early operations on the hard palate, whether involving shifting of bones as in the Brophy operation, or involving the soft tissue covering alone as in the von Langenbeck operation, frequently result in arresting the development of the maxilla and in displacing the dental organs.

By limiting the early operation principally to closure of the lip and nostril cleft and by postponing the hard and soft palate closure until the patient is at least three years of age, Ivy believes the growth of the maxilla will in most cases not be retarded, and extensive orthodontic procedures will generally be unnecessary. The procedure for the complete removal of

the premaxilla is questionable, owing to the flattening of the upper lip; the lower lip is apparently protruded, and there is a permanent opening in the anterior portion of the palate.

The correct placing of the premaxilla is a most important factor in the operation, for in a complete cleft through the alveolar process and lip, whether single or double, the premaxilla is almost always out of position.

To make a normal palate take the place of a cleft palate, an attempt should be made to manipulate the soft parts in such a manner as to avoid, as much as possible, the formation of scar tissue. If this is done, a palate soft and flexible may be produced. If incisions are made through the soft parts and measures omitted to lengthen the palate, masses of cicatricial tissue will form with contractions.

The primary purpose of any cleft palate operation is to repair the split palate, aid in establishing normal breathing, proper swallowing, and correct speech defects.

Congenital fissures of the palate, accompanied by cleft lip, are so conspicuous and of such frequent occurrence and their influence upon the patient is so depressing that measures looking toward their successful treatment have always been regarded by surgeons with deep interest. Cleft lip, with cleft palate, no doubt is one of the most distressing deformities which befalls mankind. The unfortunate sufferer, conscious of his deformity and his inability to speak distinctly enough to be understood by his associates, too frequently isolates himself and shuns the society of his fellow-men.

The secret of obtaining good speech is to establish complete velopharyngeal closure. The width of the palate is a very important factor, together with alignment of teeth, in speech corrections.

When the surgery of the case has been completed, and orthodontics has brought about the best possible alignment of teeth and supporting structures, the patient may still be left with that very important element to overcome, the speech defect. Very often it becomes necessary to resort to an artificial appliance in the form of an obturator to obtain a complete velopharyngeal closure.

Dr. Fitz-Gibbon writes: "My method of teaching the use of this appliance is by actual demonstration, but one who does not wear such an appliance can by careful study, get a comprehensive idea of how normal tones are produced with it. The tailpiece is gripped in the production of hard consonants such as 'k' and hard 'c.' The first movement for the patient to learn is the gripping and releasing one. The 'ing' tones, as in 'going' are produced with the tongue, the posterior part of which is raised and broadened, engaging the tailpiece, then releasing it. The labial tones and lingual tones must also be taught.

"One of the most important exercises which the patient must practice and master is the dilatation of the nostrils. I have used a simple form of nostril dilator quite successfully, having the patient use it in practice at home before a mirror for a period of time each day. There are certain pitches of voice that are most pleasing and suited to the individual. This pitch should be found and cultivated. There are accents and mannerisms which may be

cultivated to assist the patient and a vocabulary may be acquired so that substitute words may be used for those words difficult to produce. I have used talking machine records to advantage in teaching the use of this appliance, having the patient make them from time to time for study and comparison. The patient, hearing his own voice, more readily realizes his poor tones.

"This speech training is fully as important as the proper construction of the appliance. It is only through the tolerance, diligence and ability of the teacher, together with the complete confidence and desire to learn and to master the appliance on the part of the patient, that success can be obtained. One may wonder how long it will take to acquire perfect speech by this method. It is impossible to state a given time for this instruction. If the patient is slow to grasp the method of producing tones, much more time and instruction is required before a perfect result is obtained. Perfect result means perfect speech, delivered without effort or embarrassment on the part of the patient, and the instruction should continue until this goal is reached.

"The pronunciation for the vowel elements of speech, by the patient afflicted with a cleft palate, is quite distinct, but they are uttered with a nasal tone. Soon after the insertion of the velum obturator a marked improvement may be noted in their tone quality.

"The consonants are the forced breath sounds and it is during the pronunciation of these elements that the artificial velum plays its important part. The artificial velum should, as a normal velum, cause a complete closure between the oral and nasal pharynx during the pronunciation of speech elements containing consonants.

"The importance of the mobility of the upper lip, desirable in the production of tone even by the normal individual, cannot be over-emphasized in the case of the cleft palate patient, especially if the cleft extends so far as to form a harelip. In this connection a surgical operation is always advocated, special care being taken to match the vermillion line perfectly. The poorly matched vermillion line, besides being undesirable from an esthetic point of view, creates, if one is looking at the speaker, an impression of poor articulation."

Dr. Brophy wrote: "In the case of cleft palate, however, where only abnormal speech preceded the defect, we have a very different condition of affairs. It will be remembered that the acquirement of speech habits begins early in the second year and continues during the period of childhood. It is during this time that Nature provides for the normal development of speech. Children appear to inherit a tendency toward speech development and cases have been reported in which whole sentences have been uttered spontaneously without any preliminary practice. The more serious forms of defects of speech are those that are acquired during this formative period. It is then that faulty impressions of the elements of speech are stored in the auditory centers of the brain and faulty habits formed for the use of the various mechanisms of speech.

"When to Correct Defects.—Other things being equal, therefore, all anatomical or structural irregularities having a tendency to impede the normal development of speech during this period should have our most careful at-

tention, and measures for the correction of these conditions should be adopted as early as possible, before the cerebral impressions and peripheral habits are established. Inasmuch as surgical measures for the closure of the cleft palate are undertaken largely for the purpose of improving speech, they should be employed as early as possible before the formative speech period. Surgical measures, as a rule, however, give the patient only a little better chance for the development of good speech. Even if we were able to furnish the patient with a perfectly normal palate, it is a well-known fact that the character of the speech would remain almost unchanged, because, as I have explained above, the patient has never learned to use the natural mechanisms of speech, but he has been forced to substitute mechanisms that are inadequate to the requirements.

"No habits are more difficult to change than habits of speech. The fact is they cannot be changed without special aid and instruction. This is true, mainly, because the ear of the speaker, having grown accustomed to faulty articulation, does not discriminate between it and the normal articulation, and considerable practice is required to train the ear to make this discrimination and appreciate good speech while the organs are being trained to produce it."

Nearly all cases of complete cleft palate, even after good surgical repair, require the services of the orthodontist to align the teeth, and to stimulate the development of a normal dental arch. Many require prosthetic restorations to close the spaces where teeth are missing or to restore the contour of a depressed lip owing to lack of normal structures. Often an obturator is needed for a more complete velopharyngeal closure.

It should be the aim and purpose of orthodontic treatment for cleft palate cases: first, to establish functional occlusion by early treatment; second, to open up and establish spaces where there has been collapse, to permit artificial replacements of teeth and other normal structures for contour and esthetics; third, to prevent collapse of maxillary arch supporting the nose, and also to prevent further prognathism of mandible as a result of lingual version and collapse of maxillary arch; fourth, to correct traumatic occlusion; fifth, to aid in the improvement of speech; and sixth, to help overcome the inferiority complex of the patient as a result of the deformity.

Such structures as are present in cleft palate cases are as amenable to orthodontic stimulation and show as good response to a developmental stimulus as do the more complete structures in other patients. It is our duty, therefore, to continue the stimulation as long as further development can be secured. Intervals during which the treatment is suspended may be advisable, as in other long orthodontic cases.

Dr. Kelsey writes: "The main difference between cleft palate cases and others is that no actual structures are missing in the latter and the maloocclusion may be corrected, after which development can proceed along natural lines. Cleft palate cases, however, having more or less tissue missing will relapse and cease to develop without retention or continued artificial stimulation largely because there is never a normal continuity of the bone established across the fissures."

The combined efforts and cooperation of the surgeon, the orthodontist, and the prosthodontist will bring about the most desirable results from the standpoint of function, esthetics, and speech, and aid the patient to find his place in society and live a more normal and happier life.

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HULLIHEN, THE ORAL SURGEON

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(Continued from page 514, May issue)

The Writings of Dr. S. P. Hullihen

VALEDICTORY ADDRESS DELIVERED BEFORE THE GRADUATING CLASS OF THE BALTIMORE COLLEGE OF DENTAL SURGERY, AT THE ANNUAL COMMENCEMENT FOR THE SESSION OF 1849-50.

GENTLEMEN GRADUATES:

I am delegated by the Faculty of the Baltimore College of Dental Surgery, to congratulate you upon the successful termination of your studies—to welcome you into the ranks of the Dental profession—to present to you some of the cares and responsibilities of a professional life—to offer you a few words of general advice, and then to dissolve the connection existing between yourselves and the faculty.

In presenting myself before you, to discharge the mission just announced, there is no affectation on my part, when I assure you that I was not selected by your faculty on account of any fitness I possess for an occasion like this, but solely as a compliment to the Dental profession in the great Valley of the Mississippi, in which region of country I reside. I am here then without pretension, a plain, blunt man, to discourse to you in a plain way.

Your instructions in this institution being now ended—your examinations closed—you hold in your hands the just evidence of your diligence and efficiency in the study of the profession of your choice. Under the broad seal of this institution, you are now admitted into the ranks of authorized professional men. You are now entitled to the confidence and respect due to science and to art. You are now prepared to go forth into the world and to do honor to yourselves, good to the afflicted, and to add standing and dignity to the character of your adopted profession. These are rare and unusual qualifications for Dental gentlemen, at your time of life, to attain; qualifications which no

*From the oral service of the Ohio Valley General and Wheeling Hospitals.

where else within the range of civilization can be so well, so readily, attained as in the United States. No nation but ours can boast of a legalized Dental institution. In no country but ours are men admitted to practice the Dental profession by statutory provisions. And, to *Americans*, the greatest proficiency in this branch of the healing art is frankly and justly accorded, wherever the profession is known; aye—even by the proud and jealous Britons themselves.*

With advantages so rare, with an education so complete, your professors had no hesitation to permit your examination to be conducted by strangers; and, as if to banter on your proficiency, they composed an examining committee of gentlemen from the Medical as well as from the Dental profession.

This was an unusual, embarrassing, and a severe test for you, gentlemen, to sustain. But I am proud to bear witness that you passed through this ordeal in a manner that did great honor to yourselves, and more than honor to your professors. Well, then, may you be proud of such a conquest! Well, then, may you be congratulated upon your success in reaching thus early the high cliff on which the laurels of honor are to be gathered.

At such an eminence, with such an education, trained as you are in all the necessary branches of medical science, you will justly hold a commanding influence, a mighty power, over the rise, progress and future destinies of the Dental profession.

Carry up, then, the standard of your profession—plant it upon the broad platform of Medical Science—claim for yourselves and for your profession the same respect and importance awarded to other branches of the healing art; and that, too, upon the same ground—the ground of a *thorough scientific education*.

Until within the last ten years—until the establishment of this College—the Dental profession was looked upon as a *trade*, and its practitioners as mere mechanics; while gentlemen who devoted themselves to the treatment of the eye, the ear or skin, took rank at once with the physician or general surgeon. On what ground was this distinction predicated? By what authority was it sanctioned, and by whom promulgated? A disgraceful ignorance of medical science among the Dental practitioners was the groundwork. The medical faculty were the willing accusers, and the untiring persecutors.

They condemned, without stint, a calling they knew not how to practice, and a practice they knew not how to improve. Such of the faculty as were learned in their profession, were found always competent and fully prepared, to be Oculists, Aurists or Lithotomists, or to devote themselves to any other branch of the profession which their interest, inclination, or talents might determine, *except* that of Dental Surgery. This branch seemed to require something more than medical knowledge. It required great mechanical skill—"an education of the hand as well as of the head." A kind of education they had not received, and knew not where to acquire, and yet affected to despise. The necessities of the community cried aloud to them for help—a help which they could not bestow. This drove many sufferers to seek dental aid out of the medical profession, and to obtain that help which mechanical

*See Robinson on the Teeth, page 15-16.

genius alone could supply. At this the profession seemed mortified and chagrined, and loudly mocked at those who dared to supply their delinquencies; and united as one man in deriding the uneducated Dental mechanic.

They first created the necessity for an empiric, and then croaked forth their withering contempt on the creature their own ignorance had made.

On the other hand, the Dental practitioners, as a mass, deserved well the execrations of all honest, high-minded and intelligent men. A mere herd of mountebanks—without common education—without the least medical knowledge—without even common honesty—they arrogated to themselves a knowledge that many were incompetent to learn, and a learning they never sought to acquire. They most presumptuously called themselves Surgeon Dentists, but were in fact only rough bungling mechanics. They called their mutilations of the teeth necessary operations; and the injuries they did to those organs, extraordinary cures. In short, their impositions became a proverb—their ignorance a by-word—and their claims to science, a shameful reproach.

Thus was the science of Dental Surgery neglected, and thus abused, and thus did it fall low down into the very depths of general disrepute. In the meantime, with each succeeding year, the light of medical science blazed higher and higher; disease long hidden in darkness became revealed; suffering humanity rejoiced in the triumphs of intellect, whilst all the branches of the healing art moved on vigorously towards greater and greater improvements, *except* that of Dental Surgery. Over this branch the demon of quackery still reigned with all its hateful, degrading and destructive rule. It is true, there were some noble exceptions—some proud examples of individual effort, of individual enterprise—of great talents and industry, bestowed, in every age, upon the almost hopeless work of improving the Dental profession. Yet the labor of such worthies served but little more than to raise to themselves monuments of greatness for after generations to honor and admire.

How, then, to improve the character of the Dental profession, became a problem, and one which appeared to baffle all efforts to solve. The lapse of ages had added nothing to its claims. In the onward march of all the sciences, Dental Surgery lagged far behind. Great medical acquirements had been carefully tried and found sadly insufficient. Great mechanical skill had been fully tested, and found equally incompetent to improve and to overcome the great and obvious imperfections of Dental practice.

At last, a periodical devoted to Dental literature was established; then the American Society of Dental Surgeons was organized; and, in the deliberations of that body, a thought was promulgated—a thought which trembled on the lips of its author with more than timid apprehension, as he pronounced the sentence—“*To combine in the same person a thorough medical and mechanical education. An efficacious union of medical and mechanical skill is the only course, the only plan to make an accomplished Dental Surgeon.*” The truth flashed like vivid light upon every mind. The solution of the problem so long sought for was clearly made out, and Dental Surgery was at last disenthralled. Yes, from this little light did Dental Surgery begin to rise, Phoenix-like, from

its bed of ashes did it rise, nerved with redoubled strength, and fully destined to soar on up through coming years, until it finally gains the highest summit of honor and renown.

The Dental profession now became roused as by one impulse, and that impulse was to improve Dental practice. Though, it is true, great good was thereby accomplished, yet it was not until the founding of this College—until medical science and mechanical skill were here first taught, both separately and combined, “as the only plan to make an accomplished Dental Surgeon,” that Dental Surgery became a science in spirit and in truth. Coming then, as you do, from such an institution, with all the character, accomplishments and influences you bring, I gladly extend to you the right hand of fellowship, and cordially welcome you into the ranks of the Dental profession.

In your enrollment with this body of professional men, you are expected in due time to play a prominent part—a part consonant with the great advantages your superior education has conferred. You are not only expected to practice your profession worthily; but you are to improve its practice. You are not only to maintain the dignity of your calling; but you are to elevate its standard. You are not only to act for yourselves and your interests; but for the interest and welfare of the whole community. You are not only to declare war on the horde of impostors that infest our borders; but you are to land on the enemy’s shore, and burn your boats. You are to bestow on all things pertaining to your profession an industry that “knows no fatigue, and a zeal that recoils at no disappointments.”

Nor end your responsibilities here. You will now be called upon to sit in judgment upon the nature and character of disease; and upon the correctness of your judgment—and the care and skill displayed in your treatment, will depend the appearance—the personal comfort—the health—and sometimes, even the lives of your patients. You will be responsible for all departures in personal appearance, actions and conversation, from what is becoming a true and educated gentleman. You will be held responsible for any want of honesty, industry, firmness and perseverance, that may be necessary to accomplish the greatest good in the discharge of your professional duties. In short, you are held responsible—awfully responsible to God and man, for a full and faithful rendering of all your talents and attainments, “in all things and for all things.” See that you do no violence to your trust.

Although you are now prepared to enter the arena of professional life with an honorable title, with admitted qualifications, encouraged by friends, and urged on by a tireless ambition, you may yet fail, aye, you are bound to fail, unless you square your conduct in all things, by that golden rule which was handed from Heaven to earth, in those words of love and mercy—“Do unto others as you would have them do unto you.”

Upon the principles of this precept, you are most solemnly bound to use that same diligence, in the accumulation of knowledge, in the perfecting of practice, in the acquiring of tact, in the display of skill, that you would crave in “others,” to whom you might apply for important professional aid. Upon this precept, you are bound to extend to all men that politeness, that courtesy, that benevolence and good will, that you would have all men extend to you.

By this precept, you are required to treat the name and fame of all worthy co-laborers in the Dental profession, with that same kindness, that same candor and respect that would be most grateful to yourselves, to receive from the hands and the hearts of your professional brethren.

Governed by this principle, you will bestow the same impartial care, interest and anxiety, upon the necessities and sufferings of the child of poverty, obscurity, or of crime, that you would lavish upon the wealthy, the distinguished, or the virtuous. It will teach you to relieve with great good-will, all disease and pain that may be in your power to relieve; and that to demand pecuniary reward from the poor, the truly indigent, for such needful services would be worse than oppression, and more cruel than tyranny. In short, this precept points out to you the highest duties of your profession, the most exalted code of morals; the most refined politeness, aye, more, it fully and singularly inculcates all that is worth toiling for—all that is worth living for—all that is worth man's love, or God's approval in the doings of men.

But were it even possible for you to live blameless, to attain that excellency of conduct shadowed forth in this precept of precepts; think not that you would escape censure, abuse and outrage, in all its most wanton, cruel and disgusting accents. So long as the prince of liars reigns, so long as envy, hatred and ignorance darken the minds of men, so long will the path of every man be strewed with many thorns, and his heart pierced with many sorrows.

Be not dismayed then, should you, for a season, be neglected, decried, defamed. Time and patience will discover your merit, and will lead you forth from your obscurity, to crown you with success, and mark you for distinction. Be not discouraged, should your best efforts be unacknowledged: your greatest labors unrequited: your proudest achievements shamefully outraged. No! Toil on, toil on, with an unshaken purpose; a high resolve; a noble bearing; and you will rear to yourselves temples, and fill them with your fame. Arm yourselves then with a self-reliance; a determined purpose; a conscious rectitude. Nerve yourselves to do right, though all the world do wrong. Wear about your hearts a mail of shining honor, for that cannot be pierced or broken. But you will not only be unjustly censured by one portion of the community, but you will likewise be unjustly praised by another, and that too, for selfish ends and sordid motives. Beware of all such men, I pray you. They praise, but to please—they smile, but to deceive—they flatter, but to betray. The most dreadful of traitors betrayed his Divine Master with the sincerest token of regard; so, in like manner, do all traitors and flatterers betray. Shrink back, then, from false praise, as you would from the fangs of the speckled serpent. It is the baneful weapon of hypocrites, the shield of impostors, and the glory of fools.

But, although you may be sorely annoyed by defamers, and beset by dissemblers, still be of good cheer. If you truly deserve and need friends, you will always be surrounded by a host, friends too who will throw their virtuous influence—their impenetrable shield around you, and protect you from all impending harm. Friends who will make your cause their cause—your sorrow their sorrow—and your joy their joy. True talents and useful acquirements,

consecrated to the service of the community, are great blessings, and have in all times that are past, and will, in all time to come, secure troops of real permanent and devoted friends. Friendship is the worthy reward of usefulness, and usefulness the true measure of honor; therefore, he that can make himself most useful to his kind, is always most honored and loved. Strive then, to make yourselves useful men, particularly, to the afflicted; and your noble efforts will be crowned with the honest approbation of all good men—the tender blessings of grateful woman—the thankful look of prattling innocence—and the fervent benediction of the aged and infirm.

The duties, then, you owe to your profession, to the community, and to yourselves, are clear and imperative. They are founded upon no new and untried ethics; but upon those blessed principles of right and virtue, which every Christian mother has carefully taught her sons,—principles that are written in characters of light upon every moral and intelligent mind,—principles for which, in the conscience of every man, there is a sleepless pleader.

But, if the duties of your professional and moral career be thus plainly and clearly indicated, so are the rewards which follow the faithful discharge of those duties. Do you desire Fortune? Your profession will secure it. Do you desire Fame? Mankind will bestow it. Do you desire more? Such duties open a way from earth, "though straight and narrow," even to the Throne of God.

Engage, then, at once, in all that pertains to the great business of life;—engage in it "with all your mind, with all your soul, and with all your strength." Let your moral rectitude be a great and shining example. Your charity as boundless as the extent of human wretchedness. And your devotion to your profession next to that to your God.

And now, gentlemen, the moment of parting has come. The period you have so long desired is here. The title you have so diligently toiled for is yours. Disgrace not that title, I beg you. Use it as your ensign, but not as your bulwark, in the great battle of life, in which you are about to engage. Rely upon your own personal efforts, and upon your own mental prowess. Let your shield be your honor—your sword, truth—your watchword, victory—and your conquest, the good of all men:—and your day shall smile with the blessings it has scattered, and its record glow with gratitude from hearts it has cheered and consoled.

Gentlemen, my task is done. And now, in my own name, and in that of the Faculty whom I represent, I bid you ALL an affectionate FAREWELL.

ODONTALGIA. OBSERVATIONS ON TOOTH-ACHE. By S. P. Hullihen, Wheeling, Va.
Am. J. Dent. Sc., 1st Series, 1: 105-111, 1840.

There is no disease, perhaps, which attacks the human family so indiscriminately and so universally as the tooth-ache; none which the dentist is called upon so often to cure, and none that he treats with less success.

There can be few things in surgery more erroneous than to call every painful affection of the teeth "tooth-ache," and to treat them all as one

specific disease. As well might a wound in the scalp, a fracture of the skull, or inflammation of the brain, be called "head-ache," and treated as such.

Tooth-ache most generally originates from local causes, differing sometimes materially from each other. However, pains are oft-times experienced in the teeth through that mysterious agent usually termed sympathy: when the exciting cause may exist in a distant part of the system. Females are peculiarly liable to be affected in this way during pregnancy.

The pain of a tooth is always annoying, and sometimes exceedingly severe; but this is trifling, compared with consequences that frequently ensue from it. Diseases of the most malignant nature, and deformities the most unseemly to be beheld, are not unfrequently the results of tooth-ache, or rather the diseases which occasion it.

With these remarks, I shall proceed to treat, separately, of the different causes of tooth-ache, in the following order:

- 1st. Tooth-ache from exposure of the nerve.
- 2nd. From fungus of the nerve.
- 3d. From the confinement of pus in the internal cavity of a tooth.
- 4th. From a diseased state of the periosteum covering the fang.
- 5th. From sympathy.

TOOTH-ACHE FROM EXPOSURE OF THE NERVE

The nerve of a tooth is intended, by nature, to be protected by a thick bony covering, and when exposed either by accident or disease, it becomes extremely painful from the action of air, food, fluids, and other irritating causes.

The pain is of a sharp throbbing character, and always more or less severe, in proportion to the amount of injury or irritation that the nerve has received. The pain is generally very easily palliated, but it will immediately return upon the slightest irritation of the nerve. The nerve will sometimes remain troublesome for several months; in other cases it will frequently suppurate upon the first or second severe paroxysm of tooth-ache. But in all cases where the nerve of a tooth becomes fairly exposed, it will sooner or later invariably suppurate, leaving the crown in a state of total necrosis.

Treatment.—The treatment of this kind of tooth-ache may be divided into the palliative and the radical. The palliative consists in benumbing the sensibility of the nerve; the radical, in destroying the nerve.

To benumb the sensibility of the nerve.—The essential oils, opium, kreosote, and various other stimulating remedies have been used, and with more or less success, when actually applied to an exposed nerve. But from the very prevalent opinion that all pains of the teeth proceed from an exposure of the nerve, these remedies are often employed, when it is not possible in the nature of things that they should prove in the least beneficial.

The best perhaps of all palliative remedies is a mixture of morphia and kreosote, made into a thin paste. This preparation may be applied to the nerve on a small pledget of lint, and will most generally insure immediate relief. But in order to be generally successful in destroying the nerve of a tooth, it is necessary to resort to different means in different cases.

When the crown of a tooth is excised or broken off, leaving an exposed nerve, there is no means of destroying it so efficiently as the actual cautery. The instrument should be highly heated and plunged quickly into the nerve down the whole length of the fang, and withdrawn the same instant. The nerve is thereby disorganized, and destroyed instantaneously, producing but little or no pain. I am aware that much has been said against the use and practicability of the actual cautery in destroying the nerve; that it has been denounced as "unscientific and barbarous in the extreme"; but I must confess that I am unable to view it in such a light, and therefore beg leave to differ, in this point, from many of the most scientific and respectable dentists.

But when the crown of a tooth is to be preserved, and the nerve is exposed, the use of the cautery is generally impracticable. But in all such cases where the tooth has but one fang, the nerve may be crushed. This is done by taking a small wire or splinter of hickory, so shaped as to correspond with the internal cavity of the tooth, and plunging it into the nerve, down the entire length of the fang. By this operation the structure of the nerve is completely broken up and destroyed. But when a tooth has two or more fangs, neither the cautery nor the crushing of the nerve can be resorted to with success. The nerves of such teeth should be suffered to remain unmolested until they suppurate; a process by which nature sooner or later invariably removes every exposed nerve. With this view, the nerve should be covered with a thin plate of gold or silver, in such a manner as to prevent the least possible pressure on it, and the tooth should then be plugged. A tooth treated in this manner will sometimes remain free from pain for several months, but at length it will become a little painful and appear longer than the rest, and finally sore to the touch; symptoms that indicate that the nerve is suppurating. The plug should now be immediately removed and the pus suffered to escape through the opening in the crown of the tooth. If this be neglected an alveolar abscess will form. Of this I will treat at length, when I come to speak of tooth-ache from the confinement of pus in the internal cavity of a tooth.

TOOTH-ACHE FROM FUNGUS OF THE NERVE

Fungus of the nerve, so called from its occupying the natural cavity of the tooth, most probably originates from a remnant of the dental blood vessels. It always attacks teeth in which the nerve has suppurred, and is of a deep red color; very soft; bleeds freely upon the slightest touch; is sometimes totally insensible, at others, highly sensitive, giving much pain of an incessant character; entirely free from any darting or throbbing sensation; and when small and painful, is frequently mistaken for an exposed nerve. It varies in size, from that of a pin's head, to a pea, and larger. It is sometimes, when small, deeply situated in a fang; but more generally protrudes, filling up a cavity formed by caries.

Treatment.—To destroy this diseased growth is very difficult, and, I may say, impossible, except in such cases as permit the actual cautery to be applied to its roots; and, as the disease commences in the very foramen of the internal cavity of the fang, this means is narrowed down to very few cases when at all practicable. When a tooth becomes painful from this affection, it is only

necessary to make the fungus bleed freely, to ensure immediate relief; but in all cases, where the growth cannot be completely eradicated, the tooth should be extracted, for there is no disease of the mouth which makes the breath so intolerable.

Some time since, a young lady, about seventeen years of age, applied to me with a growth of this kind, in each of the second molars of the under jaw, which had assumed rather a novel character. She stated that the fungi had made their appearance in both teeth at the same time, about four years before, and that for the last two years she had been much troubled with a bleeding from them, which occurred regularly once a month, and continued several days. She being anxious to have the teeth saved, I destroyed, to all appearance, the morbid growth, and plugged the teeth. In a few days they became sore and painful; the plugs were removed, and a slight bleeding commenced, which continued for three or four days, and then the tumours entirely disappeared. I was therefore induced to plug them again; but in about three weeks, the teeth became sore, the plugs were removed, and a bleeding ensued as before. I now suspected it to be a vicarious menstruation, which it proved to be, and mentioned the case to the family physician. At his request, I plugged them again, and the result was precisely the same as before. The teeth were then removed, and the patient was put under a course of treatment by her physician, which effected a cure.

TOOTH-ACHE FROM THE CONFINEMENT OF PUS IN THE INTERNAL CAVITY OF A TOOTH

Whenever the nerve of a tooth is rendered near the external surface, by caries, fractures, or from the absorption and receding of the alveolar process and gum, or by other causes, it is subject to much irritation, varying however in proportion to the extent and loss of covering.

Thus a greater or lesser inflammation of the nerve necessarily ensues, producing the following very different effects. When the inflammation is slight, and comes on gradually, some dormant vessels are stimulated to action. A bony deposit takes place in the internal cavity of the tooth, and the nerve is again completely protected from all external irritation. But in a great majority of cases, inflammation is induced more rapidly and runs sooner or later to excess. Suppuration of the nerve is the consequence, and from this result may be traced the true cause of many diseases of the jaws and mouth, not generally understood.

Tooth-ache from the confinement of pus in the internal cavity of a tooth occurs more frequently than any other variety, except from exposure of the nerve. At first the tooth is painful only when hot or cold fluids pass over it, and may continue in this situation for some time. At length, a steady gnawing pain supervenes, and then the tooth begins to get sore, and appears a little loose and longer than the rest. About this period the pain assumes a very different character, darting from the tooth along the courses of the nerves, to the temple, ear, and side of the head, and to the teeth of both jaws on that side. Within twenty-four hours, the face begins to swell, and the pain changes to one of a constant throbbing description; symptoms which indicate that an alveolar abscess is forming.

When a tooth, in the manner described, becomes painful, the nerve is about suppurating; when it appears longer than the rest, loose, and is very sore, the nerve has suppurated, and the pus is beginning to ooze out at the extremity of the fang, where the vessels enter, producing much pressure, hence the sharp darting paroxysms. When the cheek begins to swell, the matter is effusing between the alveolus and its lining membrane, and occasions the throbbing pain, which always accompanies the formation of an alveolar abscess. The true abscess of the antrum maxillare originates in like manner, from the same cause, when the fangs are very near or penetrate into that cavity.

There is now and then a case that differs materially from the general progress of this disease. The nerve may suppurate, and the face swell slightly, and both pain and swelling subside, without the development of an abscess. When this occurs, the matter is insinuated between the end of the fang, and the membrane covering it, forming a sac about the size of a pea, and sometimes larger, which may be felt distinctly in the gum, opposite the end of the fang. By pressing on it, a fullness, or sensation of pressure, is felt in the tooth. But in time this sac will burst, and an alveolar abscess will be the final result.

Treatment.—As soon as it is ascertained that the nerve is suppurating, the tooth should be trepaned, or drilled. The matter is thereby suffered to escape as soon as formed, and the patient is immediately relieved from pain. In such cases, when the matter has even begun to ooze out at the end of the fang, and the face has not yet become swollen, the same treatment should be observed, and will most generally prove successful. But when the face is already swollen, and the pain is of a throbbing character, there is no remedy but the extraction of the tooth.

TOOTH-ACHE FROM A DISEASED STATE OF THE PERIOSTEUM COVERING THE FANG

This disease is an inflammation and thickening of the periosteum at the point of the fang, causing the formation of pus, and is entirely confined to teeth in which the nerve has suppurated, and produced an alveolar abscess. It is true, the periosteum at the point of the fang becomes slightly inflamed during a severe inflammation of the nerve, but suppuration is never the result of such inflammation, independently of the nerve, and never occurs until after the nerve has first suppurated, causing an alveolar abscess. The suppuration of the nerve, and the formation of an abscess is always the primary cause of this disease. The pain is generally of a dull, heavy character; the tooth becomes a little sore, the gums very much inflamed, and of a bluish tinge, immediately over and along the whole length of the fang; sometimes the gum is puffy opposite the end of the fang, and the pain of a throbbing description. In such cases, matter is forming, and a partial filling up of an old alveolar abscess takes place, forming, what is usually termed, a "gum boil." It is rarely, if ever, that the face becomes swollen from an attack of this kind of tooth-ache.

Treatment.—The pain may be greatly palliated by making an incision through the gum, along the entire length of the fang, and then applying a roasted fig or bruised raisins to the gum; but as the pain is almost sure to return upon taking cold, the extraction of the tooth should always constitute the treatment of this variety of tooth-ache.

TOOTH-ACHE FROM SYMPATHY

It is well known that the human system is sympathetically connected, in all its parts, by the nervous system; and yet some organs from being more intimately connected than others, sympathize together more frequently.

During the formation of an alveolar abscess, there is much pain and inflammation in the offending tooth and surrounding parts; the nerves become involved and irritated; the irritation extends to all the teeth of both jaws on that side, and to the ear, temple and scalp. Sometimes each tooth sympathizes in its turn, so that some one is always more severely affected for a short time than the rest, and this more pungent sensation is continually changing from one tooth to another, and to other associated parts.

Sympathetic tooth-ache occurs very frequently during pregnancy, and is evidently induced, sometimes from an increased, at other times from a diminished action, dependent on the peculiar state of the general system. But in either case the teeth are almost invariably diseased, and the painful sensation, exclusively confined to them. Sufficient indications, however, are always present, and so distinctly marked as to enable the practitioner at once to determine whether the pain proceeds from torpor or an inflammatory action.

Treatment.—When tooth-ache is induced by direct sympathy with a diseased tooth, or the results arising from one, the cause, if possible, should be removed; but if the exciting cause exists in a distant part of the system, blood-letting and purgatives will sometimes be indicated, and when so, may be recommended. But when a painful sensation is produced from want of action, or natural stimulus, the teeth should not be extracted, unless, when so much decayed as to render them useless in mastication. For many useful teeth are thus affected, and are always easily relieved, and often entirely cured by any highly stimulating application to them and the gums. To brush the teeth and gums frequently every day with a stiff brush is very advantageous, and, perhaps, more generally efficient than any other remedy.

Exostosis, is another disease of the teeth, which occasions the most intense and excruciating paroxysms; but as the pain is not generally felt in the tooth nor its proximate parts, it cannot, with propriety, be considered under the head of tooth-ache, and may, therefore, form the subject of some future paper.

OBSERVATIONS ON ABSCESS OF THE ANTRUM MAXILLARE. By S. P. Hullihen, Wheeling, Va. Am. J. Dent. Sc., 1st Series, 2: 179-184, 1841.

The Antrum Maxillare is subject to a variety of diseases, the most common of which is the abscess of this cavity.

Mr. Bell, in speaking of this disease considers it to be nothing more than an altered secretion of the membrane, and observes: "The term abscess as applied to the disease in question, has given rise to very mistaken notions of its nature, and not less erroneous principles of treatment. A reference to the structure of the antrum would appear to be sufficient to point out the improbability, to say the least, of the occurrence of abscess in such a situation. That a mucous membrane covering in a thin layer, the whole internal surface

of such a cavity, should become the seat of all the consecutive steps of true abscess, is a statement bearing on the face of it an obvious absurdity. The disease is in fact nothing more than an altered secretion of the membrane."

This opinion of Mr. Bell is surely as erroneous as any that has ever been advanced upon the subject. A mere glance at the origin of the disease will satisfy, I think, the most superficial observer, that it is in the strictest sense of the word, abscess, proceeding from the same cause, the progress and development of both being the same.

The abscess of the antrum and of the alveolus both originate in the formation of pus in the internal cavity of a tooth. Whenever the nerve of a tooth becomes nearly exposed by caries, fracture, or other causes, it is subjected to much irritation and consequent inflammation, which sooner or later runs into excess, and suppuration of the nerve and vessels is the consequence. When matter is thus formed, if it cannot escape through an opening in the crown of the tooth it will immediately commence oozing out at the foramen of the fang, and effuse itself around and between the point of the root, and the bottom of the alveolar cell. The matter now is rapidly secreted, and soon finds its way through the thinner plate of the alveolus which is generally the external, and here it is again effused between the gum and alveolus, forming what has been very generally termed "alveolar abscess."

Now if the fangs of such a tooth as just described, proximate the antrum so near that the floor of this cavity is thinner than either plate of the alveolus, the matter always seeking that direction where there is the least resistance, finds its way into the antrum, and is effused between the bone and its lining membrane. Or if the fangs of such a tooth penetrate the antrum, the membrane of this cavity being always continuous over the fangs, the pus is effused between the membrane and the bone, thus forming in either case a true abscess in the antrum. The abscess now enlarges by secretion from the surrounding parts, until the distended membrane bursts, and the matter escapes from the antrum through the duct into the nose.

To show further the identity of abscess in the antrum and that of the alveoli, at the commencement of an alveolar abscess, a tooth in which the nerve and vessels are suppurating always becomes very painful and sore, appears a little loose and longer than the rest, giving rise to the generally received opinion that alveolar abscess originates in an inflammation of the periosteum of the fang or of the alveolar cell. At this period of the disease pains dart along the courses of the nerves, to the ear, temple and side of the head. Within twenty-four hours the face generally becomes swollen, and the character of the pain changes to one of a constant throbbing, in the gum over the sore tooth. The pain continues without much abatement for several days, until the abscess breaks and begins to discharge; then all pain immediately subsides.

The same kind of symptoms in every particular experienced in alveolar abscess, always accompany the formation of an abscess in the antrum. A tooth situated under or near this cavity first becomes very painful and sore, and appears loose and longer than the rest; then great pain is experienced in the ear, temple, and scalp; the cheek becomes more or less tumefied; and then the

description of pain changes to one of a throbbing character, deeply seated in the jaw, and so continues for several days until the abscess breaks. A discharge through the nose instantly follows, and the pain in the jaw subsides.

Again, after an alveolar abscess occurs, an incurably diseased state of the periosteum, covering the point of the fang in which the abscess originated is frequently induced, and for several months after it is liable to become inflamed and painful on taking cold. When such inflammation takes place, a pain not generally of much severity is experienced. The tooth again becomes sore, the gum suddenly inflames and puffs up where the original abscess broke through it. In a few hours a discharge of matter usually follows and the pain is entirely removed. Such formation of pus in the gum may occur in the same place several times in a month, and constitutes what has been termed by some gum-boils.

After an abscess has occurred in the antrum, it is subject to the same kind of symptoms and the very same results follow as after alveolar abscess. Upon taking cold, the patient will experience a dull throbbing pain in the jaw, just sufficiently severe to be annoying. A tooth situated under or near the antrum becomes sore; in a few hours an increased discharge of matter from the antrum through the nose takes place, and the pain in the jaw subsides. This increased discharge from the antrum may continue for a few days, and then gradually diminish until it is scarcely perceptible, and will so remain until pain in the jaw and soreness in the tooth are again experienced, and then an increased discharge from the antrum will as certainly follow.

These strong marked symptoms and discharges from the antrum are only experienced during the first year or eighteen months after the formation of the abscess. After that period, the parts from the effects of disease are rendered less liable to become inflamed and painful from any constitutional or local cause. The membrane of the antrum is likewise more involved in disease, rendering the discharge from this cavity of a more uniform quantity.

The foregoing facts, together with many others I might adduce, force me to the conclusion that a true abscess of the antrum does frequently occur, and that it must be considered as perfectly identical with alveolar abscess; both originating in the same cause, the progress and development of both being the same; differing only in their locality and the consequences that naturally result therefrom.

TREATMENT OF ABSCESS OF THE ANTRUM

From the situation and structure of the antrum, it is indispensably necessary whenever it becomes diseased to make an opening into its cavity. The size of the opening should always be made with a strict reference to the state of the disease.

The First Stage of Abscess.—During the formation of an abscess, and when the patient is subject to pain in the jaw followed by an increased discharge, and the character of that discharge is healthy and well digested pus, a perforation into the antrum of such dimensions as to suffer the matter to escape freely, will be sufficiently large.

The method of opening the antrum, in such cases, is after this manner. The tooth which from all the circumstances appears most probably to have caused the disease, should be extracted and a perforation large enough to admit a common quill, made into the antrum through that alveolar cell in which the fang most diseased was situated.

The trocar employed for this purpose may be shaped like a common drill and used by grasping it firmly in the hand and carefully introducing it into the proper cell; then by pressing upwards and making a few rotatory motions the operation will be performed.

The after treatment consists in injecting into the antrum, once or twice a day, mild washes of such a strength and character as the case may require; and in keeping the orifice made into the antrum, freely open as long as there is the least perceptible discharge. This may be accomplished by cutting the flesh out of the orifice, from time to time, instead of endeavouring to keep it open by the insertion of wooden plugs, and the like, which always prove a source of irritation, prevent the escape of matter as soon as formed, and as far as I have been able to observe, are never necessary to keep foreign substances out of the antrum.

Second State of Abscess.—Where the disease is of long standing, or where the discharge is rather uniform in quantity and very fetid; and when the matter is so acrid as to excoriate the nostril and lips; it will be necessary to make a large opening into the antrum before a cure can be effected.

Method of performing the operation.—A tooth, and sometimes two should be extracted, and a perforation made through the alveolar cell as before described. After removing the gum as far as necessary, a small saw about the size of a common penknife blade may be introduced into the antrum through the opening made by the trocar, and a portion of the alveolus and floor of the antrum sawed out together, sufficiently large to admit the end of the finger into the sinus.

The after treatment is to some extent of the same character, as in the first stage of abscess. But when a pathological view is taken of a long diseased and spongy membrane, and the physiological action necessary for its restoration, something more appears to be necessary, at least to bring about a speedy cure. The first object that is to be attained in the treatment of such a membrane is to promote absorption. The second, of equal importance, is to regulate the action of the secreting vessels and to keep them unloaded, and free as possible from tumefaction. Then changing the action of both by deobstruents or local alteratives, the membrane may be restored to a healthy state. Taking this view of the subject, I have been induced to use friction, and with decided success. This may be done by brushing the membrane once a day or more, with a small stiff brush made expressly for the purpose. By this means the secreting vessels are stimulated and throw off considerable, the blood vessels still more; the membrane is reduced in thickness, the application of washes rendered more effective, and thus a cure may be accomplished much sooner than by the usual mode of treatment.

In the next number of the Journal, I will offer a few observations on "muco-purulent secretion," of the antrum, and show the difference between this disease and abscess of this cavity.

OBSERVATIONS ON MUCO-PURULENT SECRETION OF THE ANTRUM MAXILLARE. By S. P. Hullihen, Wheeling, Va. Am. J. Dent. Sc., 1st Series **2**: 253-255, 1842.

This somewhat rare but painful disease is, doubtless, the result of a morbid secretion of the membrane lining the antrum maxillare. It is evidently constitutional in its nature, and probably of a serofulvous character. Like most diseases of a constitutional diathesis, it appears to be always more or less mild or malignant, just in proportion as the constitutional taint, or predisposition, is strong in the patient; and this must serve to explain the great difference in the severity of the disease in different patients.

Among the first indications of the disease is a slight inflammation in the pituitary membrane, and differing only from a common cold in being almost exclusively confined to one nostril. As the inflammation progresses, the nostril in consequence of a thickening of its membrane, closes; the tonsil of that side becomes enlarged; the eye always filled with tears, and a yellow watery discharge is almost continually flowing from the nose on the affected side. The length of time the disease is assuming this stage differs very widely in different cases.

The second stage is marked by a slightly fetid muco-purulent discharge from the nostril, which in severe cases is of a very thick consistence. The yellow watery discharge still continues, but generally not so frequent as the purulent form. The thickening of the pituitary membrane gradually subsides, the nostril opens, and in this situation the disease remains for a shorter or longer period, until the antrum which is scarcely ever suspected of being involved in the disease becomes filled with an altered secretion from its lining membrane.

If then the disease is mild in its form, a pain of a neuralgic character will most probably be felt over the eye for sometime. Then a slight uneasiness in the antrum, and often a sensation of fullness on that side of the face. The discharge from the nostril will be sometimes watery, sometimes glairy, always very fetid, excoriating the nostril and blocking it up with troublesome incrustations. The disease is not unfrequently mistaken for ozoena, and may occasionally remain in the situation just described for several years before the walls of the antrum give way, and the true nature of the disease is revealed.

But where the disease is more malignant in its nature, in addition to the symptoms that accompany the milder form, a sensation of great weight or pressure will be felt in the antrum; after which a dull deep-seated pain supervenes; which is followed by an acute pain darting into the ear, through the temple and scalp, and over the eye in the direction of the frontal sinus. The eye waters incessantly; a thin sanguous discharge is constantly passing from the nose. The cheek begins to project, the teeth to protrude from their sockets,

the walls of the antrum at last give way, and a dark coloured secretion very thick and fetid of a slimy consistence, begins to escape through the opening. This generally takes place during the first year of the disease.

Now, in the first stage of this disease, it is evident from the thickening of the pituitary membrane; that the duct between the antrum and nose becomes closed, and judging from the state of this membrane in the second stage, it is likewise evident that the duct re-opens before the antrum becomes filled with an altered secretion. The bursting then of this cavity from an accumulation of secretion within it, does not appear to proceed from the closure of this opening, but must be attributed to the character of the secretion itself. In the milder forms of the disease, the secretion being thin, it doubtless is discharged freely through the duct. But in the more malignant the secretion is of such a consistency as to prevent the possibility of its free escape through such an opening, its accumulation is therefore inevitable, and the bursting of the antrum is the consequence. The state of the teeth appears to have no agency whatever in producing this disease. Where it is most mild, the teeth are sometimes much decayed, and where it is most malignant, they are frequently sound. The apparent soundness of the teeth alone, however, is far from always indicating the true character of a disease in the antrum. A tooth may be apparently free from disease, and yet from the absorption of the gum and alveolus, the fangs may be so much exposed and the nerve so irritated from extreme degrees of heat and cold as to induce inflammation in its internal membrane, and finally suppuration, and an abscess may be the result.

TREATMENT OF MUCO-PURULENT SECRETION OF THE ANTRUM

The character of the disease now under consideration requires both local and constitutional treatment.

On the milder form of the disease a perforation into the antrum, after the manner laid down in the first stage of abscess of this cavity, may be performed. But where the walls have already given way, and where the disease is malignant, the opening should be made with a reference to the state of the bony parieties of the antrum, which are generally more or less carious.

Where the bones are but slightly involved, the opening should be made to embrace if possible all the diseased portion; but where the caries is too extensive for this, the opening may be made of such dimensions as will enable the operator to examine fully the extent of the disease, and to remove with certainty all loose and diseased portions of bone.

After this the patient may be directed to syringe the antrum twice a day with a solution of the chloride of lime, which may be occasionally changed for a solution of the muriated tincture of iron, of lunar caustic or sulphate of zinc. The washes should be very weak at first, and gradually increased in strength until their effects are sensibly felt in the antrum for some time after each washing.

The patient will now be likewise ready for the constitutional treatment, and may be delivered over to a physician to be treated after the manner of other constitutional diseases of a similar nature. If this be neglected, the

local treatment may, it is true, often have the effect of gradually diminishing the discharge, and sometimes of checking it entirely for a time, until some derangement in the general health of the patient occurs, and then a renewed discharge from the antrum will most probably ensue. The condition of the general system must be first changed before a cure of this disease can with certainty be effected.

In the next number of the Journal, I propose to treat of another collection of fluids which occasionally occur in the antrum maxillare, differing in most particulars from both muco-purulent secretion and abscess of this cavity.

CASE OF ANEURISM BY ANASTOMOSIS OF THE SUPERIOR MAXILLARE. By S. P. Hullihen, D.D.S., Wheeling, Va. Am. J. Dent. Sc., 1st Series, 4: 160-162, 1844.

The following case of aneurism by anastomosis is reported more for the singularity of its situation than for any thing connected with its history, treatment, or cure.

In the autumn of 1841, Mrs. Stoneman, of this city, aged 22, pregnant with her first child, and having naevi materni, or mother's mark, on the left side of the nose and upper lip, showed me two small and very red protuberances or tumors of the gum, nearly of the same size. The larger was situated in the gum on the anterior surface of the alveolar process of the superior maxillare, and between the fangs of the central incisors. The smaller occupied the same situation on the posterior surface of the same process. A small cord-like enlargement ran from one tumor to the other, forcing the central incisors slightly apart. This constituted all the peculiarities of the case at this time.

The history of the case is as follows: during the first two months of her pregnancy, she had frequent and spontaneous bleedings from between the central incisors; after this, the small red tumors suddenly made their appearance, at which she became alarmed, and sought advice; but not being willing to submit to the treatment recommended, nothing more was heard from her until August, 1843. She was then five months pregnant with her second child, and had suffered much from frequent bleedings ever since the first appearance of the disease. The size of the tumors, or rather tumor, remained nearly stationary after the birth of her first child, until her second pregnancy occurred, and then it began gradually to enlarge, and was now the size of a filbert on the anterior surface, and about half this size on the posterior surface of the alveolar process. The cord-like enlargement or portion of tumor that passed between the central incisors had so increased in size as to force the teeth one-third of an inch apart, causing them and the lateral incisors to become very loose, sore, and painful. The tumor was at this time of a dark purple color, very soft, and pulsated as distinctly as the artery at the wrist. The capillary vessels on the upper lip were enormously enlarged, some distance on each side of the median line. The appearance of the case is well represented by the annexed cut. [Fig. 6.]

As the patient was now suffering considerable pain, and the bleedings from the tumor were so frequent and so profuse as to affect her health very seriously, an operation was determined upon, and performed in the following manner:

A strong pin was pushed deeply through a portion of the gum at the upper edge of the tumor on the anterior surface of the alveolar process, and parallel with the jaw. Another pin, after being bent to suit the arch of the jaw, was inserted in the same way at the upper edge of the tumor on the inside of the mouth. A strong ligature was then thrown around the ends of the pins, and carefully pushed down between the tumor and the teeth, drawn very tight, and secured by a knot. In this way the whole tumor was embraced

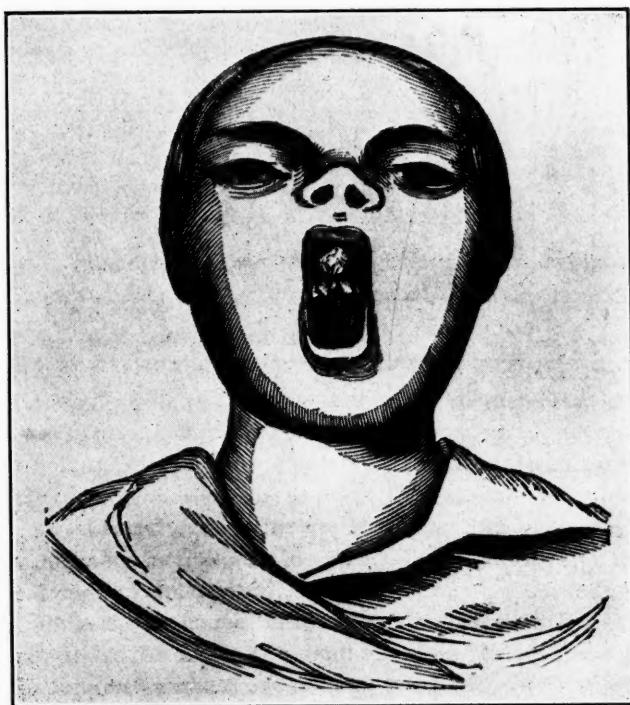


Fig. 6.

in one ligature, and in a manner that prevented the ligature from slipping or becoming displaced. On the second day the ligature was tightened, and also on the fourth and fifth. On the sixth day the tumor came away, and not a vestige of the disease remained. The parts healed up rapidly; the teeth gradually resumed their natural positions and became firm. The enlargement of the capillary vessels entirely disappeared, and the mouth is now free from all appearances of disease.

HARE-LIP, AND ITS TREATMENT. By Dr. S. P. Hullihen, Wheeling, Va. Am. J. Dent. Sc., 1st Series, 4: 244-254, 1844.

Hare-lip is the most common of all congenital deformities, and the most painfully offensive to the eye. This deformity may be divided into two vari-

ties, the single and the double. The single consists in a division or fissure of the lip, corresponding, most generally, with one of the nostrils. The double differs only from the single in having two fissures, one corresponding with each nostril. A small portion of lip is therefore left hanging from the base of the septum nasi. This portion of lip is shorter and thinner than the lip on each side. The edges and angles of the lip, formed by the fissure, are always rounded, and this rounding comprehends the only loss of substance occasioned by the deformity. Both varieties of hare-lip are most frequently accompanied with a cleft or fissure extending through the alveolar arch, the roof of the mouth, and the soft palate. With this complication, the deformity is greatly increased; the nose is more or less drawn to one side, the nostril over the cleft in the jaw is spread out and depressed, and one end of the divided alveolar arch frequently projects forward, while the fissure in the lip is thrown wide apart, and the jaws and tongue are frightfully exposed, imparting a most hideous aspect. In such cases of hare-lip, the deformity may be greatly relieved, but not removed, unless operated upon at the most favorable period of life, and then only when the operation is preceded by proper preparatory treatment.

The Age Most Favorable for the Operation.—The most favorable age for the complete removal of the deformity of hare-lip, all concede to be in infancy; but there is some difference of opinion as to the time most proper for the operation during this period. It has been urged by some writers that the first four or five months, being before dentition usually commences, is the most proper time, as the child is then most easily managed, the deformity most effectually removed, and the constitutional effects of an operation less to be dreaded, than at any other period. This opinion, however, has been ably combatted, and by high authority, on the ground that young infants bear the loss of blood badly; that the pins are liable to tear out in the lip of so tender a subject; and that the consequent irritation, attending such an operation, often produces convulsions, and even death. They therefore contend that the most proper time for the operation is from one to three years after birth.

Fearful as these objections to early operations may appear, there is, in reality, no force in them when separately examined, and in connection with such preparatory treatment as most cases of hare-lip, in young infants, imperiously demand.

That an infant can sustain but a small loss of blood compared with an adult is an important fact, and one that should be most carefully remembered. But it is strange that this objection should be urged against operating on infants for the cure of hare-lip, when the bleeding in such cases is but trifling, and that, under such entire control! While the edges of the lip are being pared off, the pins inserted, and the ligatures applied, simple pressure upon the external maxillary arteries, or upon those of the lip, by seizing the lip between the thumb and finger, is all that is required to control the haemorrhage to the most limited degree. If such simple but necessary precautions be neglected in operating, and the life of an infant be endangered or destroyed from the loss of blood, the fault is surely not in the early operation, but in the manner of its performance. This objection, therefore, is of no valid import.

That the lip of a young infant is tender, and that the pins may sometimes slough or tear out comparatively easy, when greatly stretched or dragged together over the projecting end of a cleft alveolar process, there can be no doubt. But if the division in the jaw be first closed, and its natural arch restored, the interspace in the lip would be so small that no such stretching or dragging together of the lip would be required, and sloughing or tearing out of the pins could not then of course occur. If pins, therefore, slough or tear out in some bad cases of hare-lip in young infants, the fault must not be attributed to the tenderness of the lip, but to the want of proper preparatory treatment; a very important difference.

That local irritation is a common cause of convulsions in infants is fully proved by their more frequent occurrence during dentition than at any other period of life; and that the irritation attending a great stretching or dragging together of the lip will likewise produce convulsions, in some infants, cannot be denied. Yet there is a grade of irritation necessary to produce these results, and that grade can only exist, in this operation, from too great tension of the lip, and this tension from a cleft in the alveolar process, which cleft can always be closed before an operation should be performed, thereby removing at once the necessity of any tension, the source of irritation, and the cause of convulsions. The objections, then, to early operations in infants, for the cure of this deformity, appear to have been based on certain effects which were attributed, as shown, to wrong causes.

The operation on infants, for the cure of hare-lip, before the period of dentition has commenced, is more easily accomplished, presents more facilities for the complete removal of the deformity, and is less fraught with danger to the infant, and to the success of the operation, than at any other period.

The infant, before dentition commences, has no fears of an operation, and therefore makes no resistance nor struggles, except those excited by the painful manipulations of the operator; and these being but momentary, and the child easily managed, the lip can be more satisfactorily prepared, and elegantly adjusted, than can possibly be accomplished on a child a few more months advanced in life. This circumstance, alone, is of much importance.

The facilities for the more complete removal of the deformity of hare-lip before dentition commences are very great and very important, where the deformity occurs in connection with a cleft in the alveolar and palatine arches. The bones of the face, at this period, being in a soft and cartilaginous state, can readily be brought into any desired position. The cleft in the alveolar arch can therefore be closed, its projections connected, its arch restored, which is as indispensably necessary to the complete removal of the deformity, as a perfect adaptation of the lip. In addition to all this, nature makes a greater and more successful effort to restore all deficiencies at this period of life than at any other.

The operation before dentition commences is likewise less fraught with danger to the infant and to the success of the operation than at any other period. Less fraught with danger to the infant, because the irritation consequent upon the operation can be rendered harmless, in all cases, by proper

preparatory treatment; and because an infant is much less subject to convulsions before dentition, than after this process has commenced; neither is it liable to a host of other symptomatic diseases that so frequently accompany dentition, endangering and destroying life, independent of the consequences that might be added by the effects of an untimely operation. It is less dangerous to the success of an operation, because, at this time of life, an infant sleeps more than at any other, is less disposed to fret and cry, is less liable to disturb the lip and dressings with its hands, and is far more easily managed in every way that tends to the security and successful termination of a case.

I am, therefore, decidedly in favor of early operations on infants, for the cure of hare-lip. I have operated on thirteen cases before dentition had commenced; three infants of this number were only four weeks old; and I have yet to witness the first untoward event, or the slightest unfavorable indication resulting to an infant from the operation.

Preparatory Treatment.—Preparatory treatment is applicable in all cases of hare-lip during infancy, where the deformity is accompanied with a cleft of the alveolar and palatine arches. It consists in restoring the alveolar arch to its proper form, before the operation for the cure of hare-lip is attempted.

A cleft of the alveolar and palatine arches, like that of the lip, is a congenital separation of the parts, with but little if any loss of substance. Its connection, therefore, with hare-lip greatly increases the deformity of the whole countenance. The edges of the lip formed by the fissure are always carried apart as much farther than is usual in simple cases of hare-lip, as the cleft may be wide in the alveolar arch. The nostril over the cleft is likewise stretched out and depressed; a projection of the alveolar process frequently occurs, and the face is always very perceptibly widened, all resulting from the cleft in the jaw, and all increasing or diminishing in deformity, in proportion as the cleft may vary in width.

To unite the edges of hare-lip, where this complication of the deformity exists, is always more or less difficult, and sometimes even impossible, and when accomplished will not restore the form of the nostril, correct the projections of the alveolar process, nor relieve the unseemly width of the face, except in a very limited degree. But closing the cleft in the alveolar arch corrects, at once, all these irregularities, and at the same time approximates the edges of the lip so closely that they may be most admirably united, without the least danger to the infant or to the success of the operation. It is upon these grounds that the utility and importance of preparatory treatment is urged.

The closure of the cleft in the alveolar arch may be effected in a variety of ways; but the most simple, and at the same time the most effectual, may be accomplished solely by the use of the adhesive strap, properly applied upon the cheeks.

The cartilaginous state of the bones in early infancy requires but little force to bring them into any desired position. But in removing the deformity of a cleft alveolar arch, a force of a two-fold nature is often required, both

to bring the edges together and at the same time compress any projections of the alveolar process which may exist. In the proper application of the adhesive strap may be found this happy combination.

The form of the strap which I have usually employed for this purpose is represented in the following cut. It should be left as large at each end as the size of the cheek will permit, and slitted at different places, so that it may adhere smoothly and firmly. The part required to pass over the lip should be somewhat less than half an inch in width, the edges of this part being doubled over and fastened together, in order to give it the necessary strength and stiffness.

The strap may be applied in the following manner: after being properly warmed, one end should be quickly and well adhered to the cheek of one side; then, pressing both cheeks forward, and passing the strap over the upper lip, close to the nose, it should be adhered in like manner to the cheek of the other side. By thus confining the cheeks forward, a force is obtained and exerted upon the jaw, sufficiently great to close in a few weeks the widest cleft of the alveolar arch, and at the same time to correct any projections of



Fig. 7.

its process. The strap should be kept perfectly tense. It is therefore necessary to tighten it every day or two, which may be done by cutting a small portion out of the narrow part, and then sewing it together, without disturbing its adhesions to either cheek. In this way, the same strap will last for several days, and is so easily tightened that its management may be safely entrusted to the parents of the child. As the wearing of the strap never excoriates the parts, nor produces the least pain to the infant, however young, it is advisable to apply it as soon after birth as possible, as a cleft in the alveolar arch is more easily closed at this period than at any other; and as the strap is always of very great assistance to the infant in taking its food. In cases of simple hare-lip, without any cleft in the alveolar arch, the use of the strap will enable the child to nurse at the breast with but little if any difficulty.

In the summer of 1839, I was requested to see an infant that had been born a day or two before, with hare-lip, the fissure extending into the nostril, but without any deformity of the jaw. I immediately applied the strap, with the view of enabling the child to nurse at the breast, and the experiment was perfectly successful. The child could at once seize and retain the nipple in

its mouth, and soon learned to suck without any difficulty. Since then, I never have had an opportunity of repeating the experiment, except on an infant that had previously acquired the habit of receiving its food, for a long time, from the spoon. In this case the result was entirely unsuccessful.

The time generally required to close a cleft of the alveolar arch, depends more upon the age of the infant than upon the size of the cleft. In the year 1838, M. H., of this city, requested me to see an infant of his, that had been born the night before, with a hare-lip, and the most extensive division of the alveolar and palatine arches I ever witnessed. The cleft was nearly an inch in width, causing such deformity of the face as such a division can only produce. I at once applied the strap, and by close attention to the case succeeded in bringing the edges of the alveolar process together, in three weeks from the time that the strap was first applied.

In another case where the child was nine months old, it required eight weeks to close a much smaller cleft. As this was the oldest child I was ever called upon to treat, where the use of the strap would have been of the least advantage, I have no means of determining the length of time it would require to close a cleft in a child of one or two years of age. It generally requires from four to six weeks to close the cleft in infants under five months old.

As soon as the cleft edges of the alveolar arch are brought together so as to touch each other in the slightest manner, the operation for the cure of hare-lip may be properly performed. The union of the lip in all such cases has the effect of completing the closure of the cleft in the alveolar arch. The treatment of the cleft in the roof of the mouth and soft palate must now be abandoned, until the patient becomes more advanced in life, and may, perhaps, form the subject of some future paper.

Operation for the Cure of Hare-Lip.—The general principles of the operation for the cure of hare-lip consist, first, in reducing the edges of the lip to a simple incised wound; then, in inserting the needles so that the edges of the wound may be brought evenly together until they are firmly healed. But, in addition to these general indications, a particular plan should be adopted in each operation, with the view of making a well formed lip, and this plan must be made with a strict reference to the peculiarities of the case, and be carefully and plainly marked out upon the lip before the operation is commenced.

The instruments necessary for the operation are a scalpel, for detaching the lip from the jaw, a pair of dressing forceps to hold the lip, a pair of scissors or a bistoury, to pare off the edges, three or four long spear-pointed steel needles, several silk ligatures, a pair of cutting nippers to remove the ends of the needles, and a sponge or two.

The patient, if a child, may be first wrapped up in a long towel, so as to confine its legs and arms securely, and then be placed on a narrow table, in a reclining position, and firmly held by assistants, one of them making pressure upon its external maxillary arteries, just below and forward of the masseters. If an adult, the patient may be seated upon a chair.

The operation may be commenced by turning the lip upwards, and detaching it from the jaw, to such extent as the case may require. If the interspace in the lip is small, little or no dissection will be necessary; if large, a

very free dissection is always required, extending along the jaw, and up under the wing of the nostril (particularly if it is spread out and depressed), until the detached parts give way sufficiently to permit the fissure of the lip to be easily closed, and the form of the nostril greatly improved. This part of the operation being finished, the next step is:

To Pare Off the Edges of the Lip.—This should be done in such a manner, that when brought together the lip will have a natural length, its hanging edge a proper form, and the mucous membrane covering this edge a corresponding width. To effect this, some cases may require one side of the lip to be pared off straight, and the other side concave. Sometimes both sides may be pared off straight; in other cases, both sides concave. In some cases, a broad portion of the lip may be removed on one side, and a very small portion from the other; but, in all cases, as much of the lip as may be rounded must be invariably removed. It is always better that too much of the lip should be taken away than too little.

Having determined upon a plan, and carefully drawn upon the lip the lines to be exactly followed in paring off the edges, the lip may be seized with a pair of forceps by the part to be removed, then putting it slightly on the stretch, the edges may be cut away as desired by a stroke or two with scissors or bistoury, as the operator may prefer. As each edge is pared away, an assistant should control the bleeding, by laying hold of the lip, and compressing it between his thumb and finger. The edges of the lip being removed on both sides of the fissure, the next step is:

To Insert the Needles.—This should be done at equal distances, taking a sufficient hold of the lip to prevent them from tearing out, and placing them in such a manner that the edges of the lip may be brought evenly together, both sides corresponding in every particular.

The lower needle should be always inserted first, and always in the red of the lip, and at least three lines back from the pared off edge. Then push it a little obliquely from below upwards, and from without inwards, until the point appears in the pared off edge, a little above the mucous membrane; then turn the point of the needle rather downwards, and introduce it into the other edge of the lip, precisely opposite the point where it came out first; then push it from above obliquely downwards and from within outwards, until the point appears in the red of the lip, as far back from the pared off edge as it may have been entered on the other side. A temporary ligature should now be thrown round the ends of the needle, and secured by a knot. The second needle should be inserted horizontally, and midway between the first needle and the nose, and much nearer the internal than the external surface of the lip. The third and last needle should be inserted as close to the nose as possible, and after the manner of the second. All the needles being inserted, the next step is:

To Apply the Ligatures.—This should be done so that the raw edges of the lip fit closely and neatly, without being pressed together unnecessarily tight. There is always as much danger of excessive suppuration about the needles, and of the needles sloughing out from too great a tightness of the ligatures, as from the greatest drag upon the lip, however wide the fissure may be.

The edges of the lip being properly fitted together, a short ligature may be thrown around the middle needle, and tied; then cutting away the temporary ligature from the lower needle, and adjusting the edges of the lip as they should be confined, a ligature of two feet in length may be passed round the ends of the needles, and carried backwards and forwards, crossing midway of each turn, until it is entirely consumed. A temporary ligature should then be thrown around the upper needle and secured, and the ligature on the middle needle cut away, and a long one applied in the same manner as that upon the lower needle; and then another, in like manner, upon the upper needle. All the ligatures being now applied, it only remains to cut off the ends of the needles close to the ligatures, and the operation will be finished.

No strips of adhesive plaster, nor bandages of any kind, should be applied over the lip, with the view of supporting it, until after the needles are removed. Such dressings always do more injury than benefit, by confining the secretions, and by their pressure upon the needles causing much unnecessary pain.

The needles may be removed the third or fourth day after the operation, depending entirely upon the amount of suppuration that may exist at the time, about the needles. The cheeks being held forward by an assistant, the upper needle may be seized with a pair of pliers, and after turning it round upon its axis, it should be slowly and gently withdrawn from the lip. Then removing the middle and lower needles in like manner, the assistant still holding the cheeks forward; an adhesive plaster should be applied in the same manner as described in the preparatory treatment, and in such a way as to prevent the slightest pull of the muscles upon the new adhesion of the lip. After four or five days the adhesion of the lip becomes sufficiently firm, and the wearing of the strap may be discontinued.

The double hare-lip should be treated upon the same principles in every respect, as the single. The only difference in the operation consists in cutting the small portion of lip that hangs in all these cases from the septum nasi, into a V, or wedge shape, so that it may be fitted neatly between the edges of the lip, in the upper part of the fissure. The lower and middle needles should always pass below this wedge-shaped portion, and the upper needle through it. In this way the lip may be brought evenly together and healed, the line of union having the appearance of the letter Y.

In both varieties of hare-lip, cases are frequently presented in adults, in which it becomes necessary to remove irregular teeth, and projections of the alveolar process, before an operation can be performed. In all such cases the arch of the jaw should be made as perfect as possible without any reference to the number of teeth or amount of bone it may be necessary to sacrifice in accomplishing this object. The bone nippers, saw, and tooth forceps, are the instruments usually employed in removing such deformities of the jaw.

In curing hare-lip, it should always be the uncompromising aim of the operator, to remove the deformity as completely as possible, however tedious the process or difficult the operation may be that is best calculated to effect the purpose. He that can be satisfied with any course of treatment short of this, should never do a patient the injustice to attempt the operation.

COMPOUND ROOT FORCEPS. By Dr. S. P. Hullihen, Wheeling, Va. *Am. J. Dent.* Sc., 1st Series, 4: 254-255, 1844.

The above named forceps were contrived some time since, for the purpose of extracting hollow roots of teeth with more expedition and, at the same time, with less pain to the patient than was possible with the instruments in general use; and as the forceps have fully answered the purpose for which they were intended, I have thought them of sufficient importance to lay them before the profession.

The Compound Root Forceps are about nine inches in length, and like the common straight forceps with the exception that the beak is much longer, and much narrower and thinner at the point. Lengthwise, within and between the blades of the beak is a steel tube, one end of which is open; the other

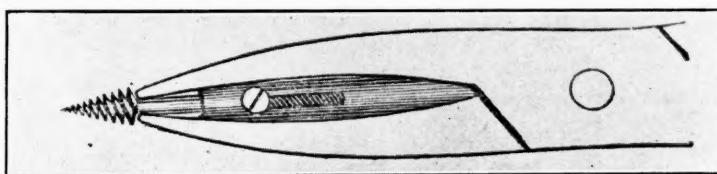


Fig. 8.

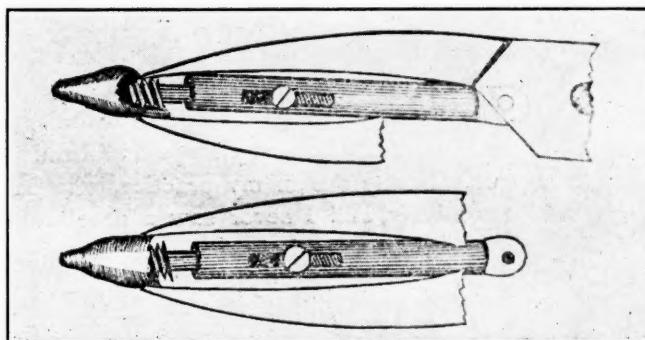


Fig. 9.

solid and flat and jointed in a mortise in the male part of the forcep's joint. When the forceps are opened, this joint permits the tube to fall backwards and forwards from one blade of the beak to the other, without any lateral motion. Within this tube is a spiral spring which forces up a shaft—two thirds of the length of the shaft is rounded and fitted neatly into the tube, the other part is a well-tapered or conical screw. The shaft is retained in the tube by a small screw, that is fixed into the shaft through a notch half an inch long in one side of the tube. The shaft and tube are so fitted together, and to the beak of the forceps, that one half of the rounded part of the shaft projects beyond the end of the tube; so that the shaft may play up and down upon the spring the length of the notch, and the screw part projecting beyond the point of the forceps, so that the shaft may be embraced between its blades, just behind the base of the screw. A full sided view of the beak of the forceps with its tube and shaft is well represented in the several cuts. [Figs. 8 and 9.]

The forceps are used by first embracing the shaft between the blades. Then screwing it gently and as deeply into the root as possible, the blades are opened—pushed up upon the root, which is then seized in either of the ways as the case may require, represented in the annexed cuts.

The screw thus combined with the forceps, prevents the root from being crushed. It acts as a powerful lever when a lateral motion is given; it is likewise of advantage when a rotary motion is made—it prevents the forceps from slipping, or of their action being lost, should even one side of the root give way in the act of extracting it—and is used with equal advantage where one side of the root is entirely gone. In short, this combination of the screw and forceps forms an instrument which fulfills every indication that can be desired in the extraction of hollow roots.

The shaft of the Compound Root Forceps is easily changed; a number of different sized screws may therefore be used in the same pair of forceps.

CLEFT PALATE AND ITS TREATMENT. By Dr. S. P. Hullihen, Wheeling, Va.
Am. J. Dent. Sc., 1st Series, 5: 166-174, 1845.

A cleft, or fissure of the palate, is a congenital separation of the parts, with but little if any loss of substance. It is more or less extensive in different cases, always commencing with the velum or soft palate, which is, sometimes, alone involved; but, more frequently it extends to a greater or less degree through the roof of the mouth, and very often through the alveolar arch. The cleft is always at the median line in the soft palate, but, as it continues forwards, it inclines to one side or the other of the septum nasi, or branches off on each side, forming what may be called a double fissure; and when this happens, one or both branches always extend through the alveolar arch. In some cases in which the cleft in the palatine arch is extensive, a considerable turning up of the edges of the divided bones may exist, which contributes greatly to the width of the fissure, the inconvenience of the deformity, and the difficulties of affecting a cure.

The consequences of a cleft palate are complex, and very distressing in their character. It prevents the infant from being nursed at the breast, impedes deglutition in after-life, interferes with mastication when the fissure is large, renders the swallowing of fluids extremely difficult, the articulation painfully indistinct, and the sufferer peculiarly liable to the lodgement of foreign matter in the wind-pipe, and all the dangerous consequences arising therefrom.

To remedy these evils, an operation, denominated staphyloraphy, has been instituted, the credit of which there is reason to believe belongs to M. La Monnier, a French dentist, who performed the operation some time previous to the year 1764. But it was left for the celebrated M. Roux to call the attention of the medical profession to the subject, which he did in the year 1819, since which time the operation has been performed by many surgeons in both Europe and America.

The operation consists in effecting a union of the cleft edges of the velum; and, in all cases, where the cleft extends no farther, and the patient is young, a most satisfactory result may be anticipated. But where the osseous palate is likewise involved, more or less of an aperture will of course remain, which must be closed either through the medium of granulations, or by a gold obturator or artificial palate before much benefit can be derived.

The earlier in life the operation can be performed the better. However, it is not often attempted much before the age of maturity, because it is thought essential to have the aid and entire consent of patients while operating, and also that they be subjected to great care and self-denial during the remainder of the cure. But experience shows that adults have, in fact, no command over that troublesome and continual motion of the parts, which always is encountered at every step of the operation; and that their consent is nothing more than to suffer their mouths to be kept sufficiently open, and their heads moderately still. Now where is the child of nine or ten years of age that could not be prevailed upon to do as much, and where is the operator of experience that would expect of any patient much more. Besides this, the operation cannot be deemed painful in its nature, nor one that requires much care and self-denial during the progress of the cure, while its effects upon the articulation, when performed in childhood, are inestimable, but if upon adults, the improvement is sometimes scarcely perceptible.

In cases where patients have arrived at the age of maturity, their habits of speech become so firmly fixed that it is almost impossible for them ever to overcome that snuffling, uncouth, hollow tone, so peculiar to those affected with openings in the palate. They have, too, in some measure, outlived their affliction, and cease to be annoyed at the attention their infirmity attracts, or to feel that degree of mortification they so sensibly experienced in their youth. They are apt, therefore, to lack that determination and watchfulness so necessary to overcome a fixed habit of any description, and more particularly the one under consideration.

But if the operation be performed in childhood, a period when the articulation is always attended to and corrected, from time to time, in every child, a perfect natural power of speech may be certainly attained. The better development of the parts may do much; the process of education will effect more; but there is an innate desire in every youthful mind to appear in society, and to the world, free from malformation of every kind, which is a never failing stimulant, sufficiently powerful to accomplish more towards a correct enunciation than all the rest. I, therefore, greatly prefer performing staphyloraphy on children of nine or ten years of age. I have operated with success on a little girl only nine years old, and with less difficulty than I have frequently experienced on adults.

As a general rule, it is not necessary to diet or reduce patients before the operation. But it is always very important that the velum should be handled, from time to time, until the irritability of the parts are, in a great measure, overcome, before the operation is attempted.

The apparatus necessary for the operation consists of a pair of slender curved forceps, six or seven inches long, the beaks coming together only at the point, and terminating in fine sharp teeth. [Fig. 10.]

Also, a spear-shaped knife; the blade one inch long, and nearly one inch wide, being very thin and sharp, guarded at the heel, and mounted on a handle five or six inches long; six needles, each half an inch long, with a shoulder near the point, and tapered from the shoulder to the eye, the points having a triangular or three-edged form. [Fig. 11.] Also, a needle-holder, on the principle of Dr. Hosack's *porte-aiguille*, but greatly simplified and improved. [Fig. 12.]

The needle-holder is composed of two parts, a staff and a slider. The staff is round, six inches long, with an arm at the top, half an inch long, standing at right angles from the staff. Near the end of the arm is a hole in which the needles are fixed, and from the end of the arm to the hole is a



Fig. 10.

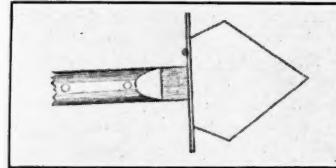


Fig. 11.

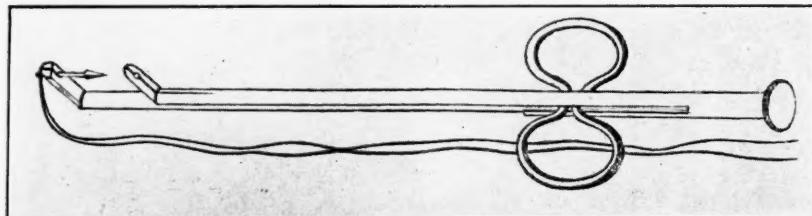


Fig. 12.

narrow slit, through which the ligatures are passed in and out as occasion may require. Two inches from the lower end of the staff, a pair of rings are affixed to receive the thumb and middle finger, the rings standing parallel with the staff, and sideways to the direction of the arm. The slider is cylindrical in its form, of the same length as the staff, and is made to fit over, and to be moved up and down upon it. The upper end of the slider is split for an inch or more like that of a pen. One half inch of this split end stands off at a right angle, exactly under the arm of the staff, and forms a clasp to receive and extract the needle from the arm. A hole opposite the one in the arm of the staff is situated between the jaws of the clasp. Through this hole the point of the needle enters, opens the clasp as it protrudes, until the clasp closed behind the shoulder on the needle. The uniform direction of the clasp is governed by the rings on the staff, they acting as guides in slits made for this purpose in the slider. Also, an instrument for depressing the tongue, a pair of common curved scissors, three strong silk ligatures, each one yard long, double and well waxed, a hard piece of cork to place between the patient's

jaws, three or four swabs, or pieces of sponge, mounted on a small rod of whalebone, a basin of cold water, napkins, and a cloth to cover the patient.

The patient being placed on a low seat, in a good light, and in a reclining position, the breast covered with a cloth, the mouth open to its full extent, and a cork well adjusted between the jaws at the last molar teeth; the operator, kneeling in front, may commence the operation by seizing the left edge of the cleft, at the base of the half uvula, with the forceps, which is to be held firmly and steadily in the left hand. Then holding the spear-shaped knife, like a pen, in the right hand, the point may be introduced into the velum half an inch back from the palate-bone, and the sixteenth of an inch from the cleft-edge, and then plunged through to the guard backwards and towards the pharynx. Thus, in an instant, the edge is severed in a straight narrow strip forwards to the palate bone, and backwards, near to the uvula. The next moment the back part of the velum is to be drawn slightly forwards, and with one clip of the curved scissors the remaining portion of the edge

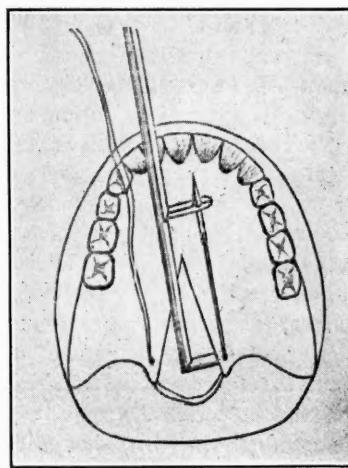


Fig. 13.

may be cut away. The cork is now to be removed from between the jaws, and the patient is allowed to rest until the bleeding in a great measure subsides. The coagulated blood and mucus is then washed away from the velum and pharynx. The cork is then replaced between the jaws, and the other edge of the cleft is removed in the same manner as the first. It now only remains to cut the detached strips loose from the palate-bone, and the paring of the edges will be finished. After bleeding has again subsided, and the blood and mucus are again cleansed away, the next step is to insert the ligatures.

The ligatures being double, with a staphyloraphy needle on each end, and having been put single through the eye of the needle, and the ends tied, the knot placed near one of the needles, so that it can be pulled through the velum, when the stitch is made, may be inserted very expeditiously, and at the very place desired, in the following manner: one of the needles with its ligature is fixed in the arm of the needle-holder, the point looking downwards, and the clasp, that is affixed to the slider, placed half an inch back from the point of the needle. Then replacing the cork between the jaws of the

patient, and introducing the needle-holder deep into the mouth, passing the needle behind the velum and the clasp in front of it, the operator, fixing his eye on the hole in the clasp, and placing the hole about a quarter of an inch back from the raw-edge, and at the base of the uvula, pushes the slider suddenly upwards, carrying the clasp forcibly against the velum, through which the needle passes, enters the hole in the clasp, is there retained, and at the same instant drawn out from the mouth with one of the ligatures. The needle on the other end of the ligature is now fixed in the arm of the staff, and passed through the edge on the other side of the cleft at the same point, and in the same manner as the first. A second ligature is then inserted, in like manner, a quarter of an inch from the raw-edge, and about the middle of the velum, and, also, a third one in the same manner, one-fourth of an inch back from the palate-bone. As each ligature is inserted, the ends may be put out of the way of the operator by turning them behind the ears of the patient. The next step is to bring the edges of the velum together, and tie the ligatures.

The coagulated blood and mucus being well cleansed from about the ligatures, the velum and the pharynx, and the cork again replaced between the jaws of the patient, the operator, selecting the ends of the posterior ligature, puts the surgeon's knot upon it, and then carries the knot down before the ends of his forefingers to the velum, draws its raw edges neatly together, and there holds them, until an assistant puts a second knot upon the ligature, conveys it down to the operator's fingers, who, at the same instant seizes it and carries it down securely upon the first knot. The second and third ligatures being tied in like manner, it only remains to cut off the ligatures about one-fourth of an inch from the knots, and the operation will be finished.

When, however, the cleft extends to a greater or less degree through the palatine arch, it frequently happens that the edges of the velum are carried so far apart that it is impossible to bring them together without causing too great a tension upon the second and third ligatures. In such cases a transverse incision may be made along the posterior edge of the palate-bone on both sides of the cleft, and through the entire thickness of the velum, and to such an extent as to permit the raw edges to be properly approximated. In accomplishing this, should it even be necessary to make the incisions five or six lines deep, they will always heal up spontaneously, without causing the slightest apprehension or difficulty.

The ligatures being tied, nothing more remains to be done during the process of the union of the edges but to guard against every thing that would probably induce the patient to have a "spell" of vomiting, coughing or sneezing. The consequences of talking and of deglutition, so much dreaded and forbidden, in the strictest manner, by most operators, I do not esteem to be the least injurious in any stage of the cure. In the summer of 1837, I performed the operation on a Mr. G. of Pennsylvania, aged about nineteen, and was under the impression that I was keeping him under the restrictions of "no talking, no eating," and but little drinking; when upon entering his room at an unusual hour, and on the very day that I had removed two of the ligatures, I found him regaling himself upon a plentiful supply of crackers and cheese, which he had procured at a neighboring grocery. He afterwards

confessed that he had indulged his appetite very often in the same way during the whole process of the cure, and, I must add, without the least injury to his palate. Since then I have always allowed my patients a full supply of proper food and drinks, and liberty to talk as much as they might wish, and I have yet to witness the first untoward event arising from either cause.

The proper time to remove the ligatures will depend in a great measure upon the amount of ulceration that may exist, at the time, about them. As a general rule, the middle ligature may be removed on the third day, the upper upon the fourth or fifth, and the lower on the fifth or sixth day after the operation. This done, no further treatment will be required.

After the velum has been successfully united, if an opening still remains in the palatine arch from the cleft extending into it; and if the aperture is narrow, and its edges free from any upward inclination, it may be closed through the medium of granulations, without any reference to the length. But where the cleft extends through the alveolar arch, or where the edges of the cleft are turned upwards, even in a small degree, there is no other mode of closing the opening properly but with a gold obturator or artificial palate.

The process of closing an opening by granulations in the palatine arch, consists in rendering the edges of the opening raw, without causing, if pos-

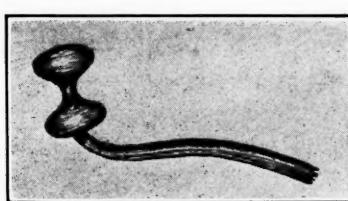


Fig. 14.

sible, any loss of substance, and, at the same time, inducing such an amount of inflammation in the parts as will insure a large and speedy supply of granulations. The knife then, of course, cannot be resorted to with much hope of success. Caustics are more suitable, yet will not meet all the indications desired, without great care and trouble. But the actual cautery, so shaped as to permit its application to every part of the edge, and heated just sufficiently to blister freely, but not to sear, fulfills every indication required. The form of the cautery that will be required for this purpose is simply a small iron instrument, not longer than a common probe, with a bulb on one end half an inch long and about a quarter of an inch thick. A deep groove or hollow is filed out around the middle of the bulb, so as to allow it to come in equal contact on every part of the edge to which it may be applied. The cautery is bent at a right angle near the bulb, and the other end well secured in a handle. The bulb of the cautery may be heated until it is slightly red, then, at the same instant, depressing the tongue with the index finger of the left hand, it may be applied by first drawing it along the edge of the opening on one side, and then on the other, until the desired effect is produced; after which, no further treatment is usually necessary until six weeks or two months have elapsed, and then the cautery may again be resorted to, and so on until the opening becomes entirely closed. As the opening decreases, the

size of the cautery must, of course, be reduced. In this manner I have succeeded in closing several openings, of greater or less extent, in the palate, and, in one case, where the cleft extended through the entire palatine arch.

The manner of constructing gold obturators or artificial palates is so generally known that I do not deem a description of them at this time necessary. They are often required from several causes, and, when properly formed and adapted to the parts, may be worn with great comfort and benefit to the patient.

ABSCESS OF THE JAWS, AND ITS TREATMENT. By Dr. S. P. Hullihen, Wheeling, Va., Am. J. Dent. Sc., 1st Series, 7: 138-151, 1846.

This very common and very painful affection of the jaws may take place at any period from infancy to old age, but occurs most frequently from childhood to middle life, and much oftener in the upper jaw than the lower. It never attacks jaws where there are no teeth, nor roots of teeth, nor where the teeth are not in some way implicated. It mostly appears in that region of the jaws where the roots of the teeth terminate, and generally requires from two to four days for its complete formation. It is most formidable when it happens in connection with the cuspidati of the upper jaw, or the dentes sapientiae of the lower, at all other times it appears to be more or less severe in proportion only to the thickness of the alveolus, when it originates in such a manner as to be influenced by that cause. The face always becomes considerably swollen from an attack of this disease, and occasionally the swelling extends to the eye-lids, sometimes to the neck, and sometimes to the tonsil of the affected side, and the jaws not unfrequently become entirely closed for a time from the same cause. There is always more or less disturbance of the general system accompanying this complaint, which should be regarded as the effects of the disease, and not as the exciting cause.

Abscess of the jaws originates most frequently within the internal cavity of a tooth; it may, however, occasionally take place from mechanical violence within the alveolus; and still more rarely from a conjoined inflammation of the gum, the periosteum of a fang, and of the alveolus. All cases that may occur from other causes, if not entirely unique in themselves, are decidedly anomalous in their character, and should not be regarded as having any relation to the common abscess of the jaws save in their location and general appearance.

Up to the time that Thomas Bell published his excellent work on the teeth, this disease was generally designated by the name of "gum-boil." "The very name," says Mr. Bell, "is at once a proof of the mistaken notion commonly entertained respecting its nature, and the means of perpetuating the error. The gum is in fact only secondarily affected, the cause being invariably seated within the alveolus." He therefore proposed, "to call it alveolar abscess as more correctly designating its true nature and situation." A term which was at once adopted by the profession and has been employed ever since—a term, which, on account of its supposed appropriateness has caused a greater and a more general mistaken notion respecting the true cause and origin of the disease than ever the use of the term gum-boil could have possibly induced. That

this disease does not invariably originate within the alveolus as stated by Mr. Bell, but most frequently within the internal cavity of a tooth, is a fact that can be fully sustained beyond doubt or cavil. That abscess may now and then originate within the alveolus cannot be denied; that it sometimes originates in the gum can be as clearly shown. But cases originating in such situations are extremely rare when compared with those in the internal cavity of a tooth. I will now endeavor to demonstrate. For the purpose, however, of avoiding the total unfitness of the name gum-boil, and the erroneous impression the term alveolar abscess inculcates, I propose to treat of the disease under the general head of abscess of the jaws, not intending by the name to indicate anything in relation to the origin of the disease, but simply the usual place of its development. As to the origin of the disease the several causes will be separately examined, and the difference in the progress of the disease arising from each cause will be carefully noticed in the following order:

Firstly.—From the suppuration of the dental nerve, and the consequent discharge from the internal cavity of a tooth.

Secondly.—From mechanical violence within the alveolus.

Thirdly.—From a conjoined inflammation of the gum, and the alveolo-dental membranes.

In submitting the proposition that abscess of the jaws most frequently originates in the suppuration of a nerve, and the consequent discharge from the internal cavity of a tooth, I wish it to be clearly and explicitly understood, that such a result is only claimed in cases where the discharge takes place through the foramen at the apex of a fang, and in no case where it can escape through an opening in the crown or body of a tooth—and that all the symptoms hereafter noticed as being attendant upon this form of abscess have a strict reference only to where a discharge occurs through the extremity of a fang.

The suppuration of the dental nerve is one of the most common afflictions to which the teeth are liable, and is most frequently induced from the irritation to which the nerve is so constantly exposed, and in such a great multiplicity of ways through the encroachment of dental caries. It sometimes follows extensive fractures of the teeth, sometimes their partial dislocation, and occasionally, great and sudden exposure of their roots from the receding of the gums and alveolar process. From whatever cause suppuration of the nerve may arise, the symptoms are substantially the same; the amount of irritation and situation of the tooth governing, however, to some extent the rapidity of its course, and the intensity of the accompanying pain.

The symptoms arising from the suppuration of the nerve are generally very uniform and well marked in their character; at first a tooth becomes painful only while hot or cold fluids pass over it; soon, however, the pain will continue for a few seconds after the occurrence of such an irritation; then the paroxysms will be prolonged to a few minutes, and then to a continuous dull heavy pain, the tooth will now appear a little sore, loose, and longer than the rest. These symptoms gradually increase, and with them the intensity of the pain. The gum then becomes more or less tender opposite the end of the root. The pain will begin to dart along the courses of the nerves to the teeth of both jaws, the ear, and temple of the side affected; the offending tooth will now become ex-

quisitely tender, the face to swell, and a most distressing pain of a throbbing character will be experienced in the jaw until the abscess is formed and its contents begin to be discharged.

When a tooth becomes painful in the manner just described, it is certain indication that the nerve is about to suppurate. When a tooth is very sore, loose, and longer than the rest, suppuration of the nerve has then already taken place. When the face begins to swell, and the pain is of a throbbing character, matter is then oozing through the foramen at the apex of the root, and a small sac is forming between the end of the root and its periosteum, in a short time this sac gives way, and the discharge is effused around, and between the point of the root, and the bottom of the alveolus; the matter is now rapidly secreted, and sooner or later finds its way through the thinner plate of the alveolus, which is most generally the external, and here it is again effused between the soft parts, and the alveolar process, giving rise to all the symptoms and appearances before described as being attendant on the latter stage of abscess of the jaws.

Now and then a case may occur where the nerve suppurates, and the face swells, and both pain and swelling subside without the development of an abscess; in such cases the little sac that forms on the end of the root, does not break as usual during the first few hours of its existence, but continues to enlarge until it becomes the size of a pea, and sometimes larger, and very often remaining in this condition for several months; sometimes the nerve may suppurate without causing the formation of a sac, or any swelling of the face. In such cases the foramen of the roots probably is too small, or the matter too thick to admit of its escape from the dental cavity; sometimes the nerve suppurates, and the face swells, and a discharge follows, which, however, escapes from the place of its formation along the side of the root, instead of passing through the alveolus and gum. But all such cases must be regarded as rare exceptions to the usual course which follows the suppuration of the dental nerve.

A nerve may suppurate and a discharge take place through an opening in the crown of a tooth, or from a fang, which may continue for years without occasioning either soreness of the tooth or gum. But if at any future period the outlet of this discharge be stopped, either by plug or pivot, or any other cause, it will most generally find its way through the foramen of the tooth, producing the very same effect as though it had taken place immediately after the suppuration of the nerve.

One of the most prominent pathological conditions of a fang that has been once involved in an abscess of the jaw, where the disease originates in the internal cavity of a tooth, is the existence of that little sac before described, which forms in all such cases at the apex of the fang. It was doubtless this sac that led Mr. Bell into the belief that the cause of abscess was invariably seated within the alveolus. In reference to this he says, "The first effect produced by the irritation of a diseased tooth, or a dead root, is a thickening of the periosteum of the alveolar cavity, which rises the tooth in the socket, and renders it a little loose, and susceptible of considerable pain on pressure; an effusion of coagulable lymph then takes place around the extremity of the fang, which becomes condensed into a sac, in the centre of which pus is formed." As I have before shown that all the symptoms here referred to by Mr. Bell, as being present in the

commencement of abscess, are the result of the suppuration of the dental nerve, and that the little sac which he describes on the extremity of the fang, and attributes to a consolidation of the coagulable lymph, was invariably the result of a discharge from the internal cavity of a tooth; I will therefore only notice, and in a general way the unsoundness of his views, in a pathological sense.

If the first effect of a diseased tooth, or dead root, is a thickening of the periosteum of the alveolar cavity; then the conclusion is imperative that it is because this fibrous tissue is most easily excited, and, if most easily excited, it is here where the first and greatest amount of inflammation would follow. How then does it happen that coagulable lymph, which is the legitimate effects of inflammation, should take place around the extremity of the fang, and at the extremity only, and that no deposite of lymph whatever takes place on the periosteum of the alveolus, where the inflammatory action first commenced; and how does it happen that the coagulable lymph which is effused around the extremity of the fang, should always be found in the same state, whether in the commencement of the disease or in its latter stage? Be the sacs small or large, it is always the same, always fleshy, always condensed. If I mistake not, these interrogations cannot be answered in accordance with any of the known and well established principles of physiology.

In addition to the evidence I have already adduced in support of the doctrine, that the sac which is formed at the extremity of a fang is invariably caused by a discharge from the internal cavity of a tooth, I will offer as farther proof, the facts set forth in Mr. Bell's description of the peculiar form which these sacs assume; he says, "these sacs assume different appearances, depending upon the nature of the teeth upon which they have been formed. Thus, at the extremity of a round root, the internal cavity of which is simple, the sac is single, and of an oblong or pyriform figure; but in the case of its being formed upon a bicuspid tooth, the root of which is longitudinally contracted, so as to separate the internal cavity into two, having each a distinct foramen at the point, the sac is often double, and has the appearance of two small globular sacs united together." If the cause of abscess is invariably seated within the alveolus, and the effect of this cause a deposit of coagulable lymph, which is condensed into a sac at the extremity of a fang, why does this peculiar relation of the sac to the internal cavity of a tooth exist? How does it happen that where there is but one internal cavity to a fang, there is always one sac; but where there are two internal cavities, there are always two sacs? This uniform relation of the sac to the condition of the internal cavity of a fang proves conclusively that there is a connection between the two; then if a connection exists, it must be a diseased connection; and I must therefore insist that this diseased connection consists in a discharge from the internal cavity of a fang, explaining at once, the origin and formation of the sac, and the uniform relation which it always holds to each foramen that may exist in a fang.

Professor Harris in his notice of a paper that was published some time since, in which I attempted to show that the true abscess of the antrum maxillare, as well as that of the alveoli, originated in a discharge from the internal cavity

of a tooth, says, "the pulp, or ganglion, as some French writers term it, may suppurate, and the matter be confined in the cavity of the tooth for a long time, without causing alveolar abscess, and the purulent matter contained in the sac at the extremity of the root of a tooth, is not formed, as Mr. Hullihen supposes, in the cavity of the organ. The alveolo-dental membranes at the apex of the root of a tooth around the nerve cord, are more vascular and are endowed with greater nervous sensibility, than at any other part, consequently the inflammatory action here is always the greatest, and it is here suppuration first takes place."

While I freely admit that Professor Harris is excellent authority on most subjects of which he treats, yet I must insist that his views in relation to this disease are both inconclusive and problematical. That the nerve may suppurate, and the matter be confined in the cavity of a tooth for a long time without causing abscess, is a fact I admit, and have already explained. To merely proclaim that the matter confined in the sac at the extremity of the root of a tooth is not formed in the cavity of that organ, to say the least, is a very inconclusive kind of refutation. But to contend that the alveolo-dental membranes at the apex of the root of a tooth are more vascular and are endowed with greater nervous sensibility than any other part, is a doctrine that is new, highly problematical and incongruous. The alveolo-dental membranes situated as they are, between two bones, are necessarily endowed with but little vascularity and nervous sensibility, else the comminution of the food could not be endured, is it reasonable then that the apex of the root, the very place of all others most likely to be affected in mastication, should be endowed with greater nervous sensibility than any other part?

The office of the periosteum of the teeth and alveoli has long since been settled, and is well understood. How then does it happen that this greater vascularity and nervous sensibility at the apex of the roots have been overlooked until now, and if overlooked, what are the purposes of such an organization? The fact is, no such an organization exists; it is true, however, that when the periosteum of a tooth becomes inflamed, it is almost invariably at the apex of the fang, occasioned, as I have already shown, by a discharge from the internal cavity of the tooth. It was doubtless owing to this condition of the fang that Professor Harris has been led to suppose that the periosteum at its extremity was more vascular, and endowed with a greater nervous sensibility than any other place.

But supposing this greater organization of the periosteum at the extremity of a fang could be clearly demonstrated, Professor Harris must doubtless acknowledge that the different kinds of irritation to which the nerve is exposed from the encroachment of dental caries, to be one of the most frequent exciting causes of the inflammation at the extremity of the fang, of which he speaks; and likewise, that the nerve or pulp of a tooth is more highly vascular, and endowed with greater sensibility than the alveolo-dental membranes are at the extremity of the roots; then if the nerve or pulp is most vascular, and greatly the most sensitive, and exposed as it is more directly to irritations of different kinds, is it not most rational to conclude that inflammation and suppuration would

take place in the nerve or pulp before it would occur so remotely from the seat of the exciting cause, as at the extremity of the fang? This conclusion appears to me to be self-evident.

As sacs differ much in size and appearance after an abscess of the jaw has once occurred, it may be well to notice some of the most common features attending this stage of their existence; in all such cases more or less of a rupture may be found to exist in them, sometimes the sac will be so small that it appears like a thickening of the periosteum only; sometimes they are as large as a pea, well defined, and full of pus, sometimes the rupture in the sac is opposite the foramen of the fang, and very small, sometimes in the side and very large, but in all cases the bone of the fang is completely denuded so far as the sac extends, proving that the matter collects between the periosteum and the bone of the fang, and that the sac is nothing more than a separation of the periosteum from the bone, and filled with pus from the internal cavity of the tooth as I have already shown. The existence of a sac, therefore, should only be regarded as an effect developed in the progress of an abscess and not a condition of the first cause of the disease.

An abscess of the jaw cannot possibly originate but once in the same root of a tooth. Yet the sac that forms upon the extremity of a root in such cases often keeps up more or less of a discharge through a fistulous opening in the gum for a long time after the occurrence of an abscess, and likewise renders the gum extremely liable to become inflamed and painful, to swell, and to discharge upon the patient taking the slightest cold. Such attacks of the gum may sometimes occur several times in the course of a month, and sometimes not more than once or twice in a year, and should be regarded as the chronic stage of an abscess, and not as separate and distinct attacks of the disease.

Having now examined the origin, progress and development of abscess in the jaws arising in a discharge from the internal cavity of a tooth, I will next proceed to describe the condition of the same disease when it takes place.

From Mechanical Violence Within the Alveolus.—This variety of abscess of the jaws originates from the cracking or splitting of weak fangs in the act of inserting pivot teeth—from driving pivots into fangs so forcibly as to bruise the membrane within the alveolus—from heavy blows upon the teeth—from fractures of the alveolar process, and such like causes where direct violence is done to the periosteum of the fang and alveolus.

The first symptom of the disease is a soreness of the tooth or fang that may be involved. This soreness commences soon after the injury has been inflicted, and gradually increases until the gum and face begin to swell, and then the symptoms and progress of the disease are precisely the same as where it originated from a discharge from the dental cavity, save that in some cases the location of the abscess is more particularly confined to the gum itself.

Thus having briefly pointed out the peculiarities that are usual in abscess of the jaws when occasioned by mechanical injuries, I will pass on to a farther description of the same disease when it originates.

From a Conjoined Inflammation of the Gum and Alveolo-Dental Membrane.—This form of abscess invariably originates in the edge of the gum, and is most

generally induced by the violent irritation to which this part of the gum is exposed in all cases where it extends partly over a fang, or the crown of a wisdom tooth. The disease is therefore almost exclusively occasioned by roots of teeth, and the wisdom teeth of the lower jaw, but may now and then take place from other causes, and about any tooth in the mouth. The inflammation thus occasioned gradually extends from the gum to the periosteum of the root of a tooth, and of the alveolus, the gum becomes more and more involved; the inflammation then extends to the neighboring parts, more or less pain or swelling accompanies the attack, and finally the formation of an abscess is the result.

The first indication of the disease is an exquisite tenderness of that part of the gum that may project over a fang, or the crown of a wisdom tooth. When a fang is involved, the inflammation in the gum gradually extends around the fang, and it becomes painful upon the slightest pressure; then the gum begins to swell, which sometimes extends to the face; then a pain of a throbbing description is experienced, and matter forms near the base of the fang and edge of the gum.

But where the wisdom tooth is involved, in addition to all the symptoms just described, the face often becomes enormously swollen, the jaws completely closed, and the pain of the most excruciating character; in all such cases the appearance and developments of the abscess are precisely the same as when it originates in a discharge from the internal cavity of a tooth. Yet the pathological condition of the tooth implicated points out most clearly the difference in the origin of the disease.

Where the periosteum of the root of a wisdom tooth becomes involved in an inflammation with the edge of the gum, the inflammation travels from the base of the root toward its apex, when, from the suppuration of the dental nerve, the inflammation travels from the apex toward the base. When an abscess originates from the first mentioned cause, the dental nerve is never implicated; when from the latter, it is always destroyed; when the first mentioned disease commences about a fang, the abscess always forms near the edge of the gums; when from a discharge through the foramen of a fang, or from the effects of a sac, the abscess forms opposite the extremity of the fang; thus the difference in the origin of the disease is very palpably indicated.

TREATMENT OF ABSCESS OF THE JAWS

The treatment of this disease may be divided into the preventive, the palliative and the radical.

The preventive treatment, where the disease is originating from the suppuration of the dental nerve, consists in trepanning or drilling the tooth as soon as matter is formed; the opening should be large enough to admit the free escape of the discharge, and should be made where the bone is thinnest, between the cavity and the external surface; the matter may then be completely dislodged by probing the cavity with a very small silver sound. In cases where the disease is originating in the stoppage of a chronic discharge from the internal cavity of a tooth, either by a plug, a pivot, or in any other way, the cause of the confinement of the matter should be removed upon the first occur-

rence of any unpleasant symptoms. When a bicuspid or molar is affected in this way, the plug should never be replaced; but where a cuspidatus or either of the incisors is affected, the internal cavity of the fang should be carefully but thoroughly cauterized with the actual cautery, and then the plug or pivot may be replaced with perfect impunity.

The portion of the cautery that is to be introduced in the fang should be filed as near as possible into the shape of the cavity: the cautery may then be highly heated, and plunged at the same instant, and as deeply as practicable, into the fang, and then withdrawn the same moment; this should be repeated again and again, until every thing of a nervous, fibrous or fleshy nature has been entirely destroyed. The use of the actual cautery upon the teeth has been strongly reprobated by some dental practitioners, who, either on account of their timidity or the want of that dexterity which is necessary to its successful application, have been led to condemn its use in no measured terms. Yet the correctness of this practice in such cases and upon such teeth as just described, still remains to be successfully controverted.

The preventive treatment, where abscess is originating from mechanical violence within an alveolus, after the occurrence of some outrage upon a fang, or from fracture of the alveolar process, consists simply in removing the cause of irritation as soon as possible after the injury has been inflicted.

The preventive treatment, where the disease is originating from a conjoined inflammation of the gum and alveolo-dental membranes, consists in removing promptly the portion of gum that may extend partly over a fang, or wisdom tooth, to such an extent as will prevent all future irritation from the same cause. General or constitutional treatment is of no avail in this stage of the disease.

The second stage of abscess of the jaws commences at that period when the matter is beginning to be effused between the gum (or the soft parts) and the alveolar process; from this time onward the disease always assumes the very same general characteristics, whether it originates within the internal cavity of a tooth, an alveolus, or from an inflammation of the gum and alveolo-dental membranes, and therefore the very same course of treatment must be observed, without any reference to the origin of the disease.

The palliative treatment may be commenced soon after the gum and face begin to swell, although, as a general rule in surgery, it is extremely improper to open an abscess before it begins to point, except in cases where the matter is forming under the periosteum, and then for the necessary preservation of the bone the abscess should be opened as soon as any matter is formed. It is upon this principle that the early opening of an abscess of the jaws is urged, the matter in such cases, after leaving the alveolus, collects between the periosteum and the external surface of the alveoli, and more or less destruction of this process must inevitably follow. To prevent such disastrous consequences, an abscess of the jaw should be opened as soon as the nucleus can be felt, which can always be done shortly after the gum begins to swell, except in cases where it arises from a wisdom tooth of the lower jaw. In this operation, a very slender knife may be employed, by inserting it in the edge of the tumefaction, where it extends farthest into the gum; and in pushing the knife forward until the

point reaches the germ of the abscess, then, in the act of withdrawing the knife, an incision should be made corresponding with the base of the swelling, and parallel with the jaw, from one-half to three-fourths of an inch in length; after the bleeding subsides to some extent, a thin piece of silk or linen, of nearly the length and breadth of the incision, should be spread out between the edges of the wound, so as to prevent reunion from taking place. The use of pledges of lint or of lunar caustic, for the purpose of accomplishing the same object, is to be deprecated on account of the unnecessary pain which they always occasion.

The employment of hot poultices, which are so generally and indiscriminately used, alike both as a preventive and a promoter of an abscess, is of doubtful value, except so far as their warmth and moisture may ameliorate the condition of the skin, in cases where it becomes more or less inflamed; and in such cases, cloths wrung out of hot brandy, and applied as warm as the patient can bear, is decidedly preferable. General treatment sometimes may be resorted to, with a view of controlling the constitutional effects that may arise in this stage of the disease, but never with a view of subduing the disease itself.

The third or chronic stage of abscess of the jaws constitutes cases where more or less matter escapes through a fistulous opening, and where the gum is liable to inflame, swell and discharge every time the patient may take a cold. This form of disease may always be speedily relieved by making a free incision down to the bone, through the inflamed portion of the gum. The employment of leeches, to whatever extent, in such cases, is inadequate, because such attacks of the disease result more from an increased collection of matter, than of an inflammatory action.

The radical treatment of abscess of the jaws, I need scarcely add, consists in the removal of the tooth, or the roots of a tooth that may be involved in the disease; this is always the most successful and the most rational course of treatment, and should be adopted in all cases where circumstances will admit, and in every case where the exciting cause originates in any way with the wisdom tooth of the lower jaw, so soon as the face begins to swell; for there is no disease of the mouth more painful and unmanageable than abscess when it takes place from this cause.

WHEELING, VA., DEC. 10TH, 1846.

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Development of the Temporomandibular Articulation in Man. By Dr. Harry Sicher, Zeitschrift für Stomatologie 35: 269, 1937.

The form and function of the temporomandibular articulation are two of those few characteristics which are peculiar to man. Only in man can one find the presence of a well-developed tuberculum articulare and the combination of hinge movement and sliding movement in the opening of the mouth. The temporomandibular articulation of the anthropomorphic apes has no tuberculum (orang, chimpanzee) or only an indication of one (gorilla). The opening of the jaws in these animals is entirely a hinge movement.

The reason for these peculiarities of the articulation in man is due to his upright position. This mode of walk brings about two anatomic adaptations in the region of the head: (1) A pronounced forward inclination of the base of the skull so that the plane laid through the occipital foramen points forward and downward instead of backward and downward. (2) The development of the mastoid process due to the insertion of the M. sternocleidomastoideus which has the function to carry the head.

The forward inclination of the base of the skull together with the development of the mastoid process tends to narrow the space behind the articulation (fossa retromandibularis). While a true hinge movement is feasible, the compression of the soft tissues in back of the articulation limits the excursion of the lower jaw to about two-thirds from the total excursion obtainable if the hinge movement is combined with forward sliding. It is quite in analogy with other articulations, like those of the extremities, that the compression of the soft tissues finally puts a stop to the excursions. If the lower jaw is pulled forward, the narrow fossa retromandibularis is opened up and further opening of the jaw can proceed without undue compression of the soft tissues. For this reason, the joint has been termed a "hinge articulation with a moving axis"; the articular tubercle is nothing but a support for the condyle head. The existence of an articular tubercle is always a definite indication that we are dealing with a human temporomandibular articulation.

A further difference between the jaws of man and ape is the relationship of the foramen mandibular where the inferior dental nerve and vessels enter the canal, to the beginning of the sulcus mylohyoideus, where the N. mylohyoideus and its vessels lie. The place of entry for these nerves and vessels must, naturally, be at a point which is relatively stable, where the excursions of the mandible are smallest. This point is, in the human mandible, the place where

the mandibular foramen and the sulcus mylohyoideus begin. In the complicated mechanism of the human articulation, there is just one optional point, and this point must be the common place of entrance for both nerves. In the ape's jaw, the hinge articulation provides an even distance of all points of the mandible from the center of rotation, and it makes, therefore, no difference where the nerves enter. As a matter of fact, the sulcus starts sometimes 3 or 4 mm. away from the opening of the mandibular foramen. If a jaw has the places of entrance for the two nerves some distance apart, then it is evident that it was designed for a hinge movement and that the jaw cannot be a human jaw.

Let us consider the Piltdown findings in the light of these facts. The findings consist of fragments of a skull and one-half of a mandible. The skull, despite some primitive characteristics, belongs definitely to homo sapiens. The mandible, on the other hand, appears so much like that of a chimpanzee that scientists are split into two groups: one which assumes that all the fragments belong to one individuum, and one which believes that the skull belongs to homo sapiens and the mandible to an ape.

The Piltdown skull includes a well-preserved temporal bone and the temporomandibular joint shows all the characteristics of a truly human articulation, before all, a well-developed tuberculum. One can assume with great certainty that the bearer of such a temporal bone possessed an articulation which consisted of a combination of hinge and forward sliding, a human characteristic. The mandible (its condyle head is missing) shows the opening of the two canals quite a distance apart, indicating that the opening mechanism was a pure hinge movement, and not of the human type. The two bones can, therefore, never belong to the same individual.

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Oral Tumors

Regarding the Pathogenesis of Parodontal Cysts. Essay on Classification of Cysts of Dental Origin (*À propos de la pathogenie des kystes parodontaires, Essai de classification des kystes d'origine dentaire*). By J. Despons, *J. de méd. de Bordeaux* **114**: 472, 1937.

According to American classification the parodontal cyst is a subdivision of odontogenic cyst. It forms neither at the apex (radicular cyst) nor around the crown of a forming tooth (dentigerous cyst), but develops laterally. The author insists that this type of cyst is of embryonal pathogenesis, being formed from dental epithelium, particularly the tooth buds for a third dentition which in man does not generally terminate in tooth formation. This epithelium has the potential ability to produce all types of cells found in the enamel organ, which in turn may all be found in these cysts.

The writer believes that the parodontal cysts behave like tumors, having a tendency to develop progressively, causing deformity of neighboring cavities without causing infection. The contents are always aseptic unless there is an opening into the mouth allowing secondary infection. They may form adjacent to perfectly normal teeth.

He further contends that in parodontal cysts the epithelium may proliferate into the underlying tissue, penetrate the capsule, and invade the adjoining bone which is the reason why recurrence is frequent after incomplete operation.

The cyst may be unilocular or multilocular. Each has an epithelium of characteristic histologic arrangement. The unilocular type is generally benign. In the multilocular type the different types of epithelial cells are irregular and anarchical, which is the reason for their greater malignancy; they are, in fact, adamantinomas. When of ordinary monocystic appearance, discovered by x-ray examination, the cyst may still be an adamantinoma of latent character. In this stage complete excision may be easily accomplished. Later when definitely multilocular, it has undergone a malignant transformation which makes surgical success, even with sacrifice of important tissue, less certain. For this reason histologic examination is advised in all cases of cysts which are found to be questionable in clinical or roentgen study.

Tumors of the Jaw. By H. M. Worth. *Brit. J. Radiol.* **10:** 223, 1937.

This article deals principally with tumors occurring only in the jaws, because of the presence of dental tissue. The local type of osteitis fibrosa, however, is also described. The tumors of dental origin are termed "odontomes"; cysts, dental and dentigerous, are included among these tumors, which is not in accordance with the American custom. The following is the classification of the author:

Epithelial odontomes arising from the dental epithelium alone:

- Dental cysts
- Dentigerous cysts
- Multilocular cysts

Composite odontomes arising from the dental epithelium and dental mesoblastic tissue:

- Complex odontomes
- Compound odontomes
- Geminated odontomes
- Dilated odontomes

The description of dental cyst includes both what we term radicular cyst and follicular cyst without tooth formation. Attention is called to the fact that in the presence of secondary infection and suppuration the typical cystic cortex may have been destroyed, and that it is sometimes difficult to distinguish a cyst from the maxillary sinus. Points for differential diagnosis are: The cyst has a cortex which is usually more sharply defined and less wide than the antral wall; the cyst outline is sometimes more of a true circle than the antral wall.

The dentigerous cyst is less common and occurs in younger patients; it may be multiple. The multilocular cyst is the adamantinoma occurring as solid and cystic type. The first presents a honeycomb appearance which may be mistaken for an osteoclastoma. The latter occurs with the margin of bone clearly defined, not corticated and with irregular trabeculation, and as the true multilocular type with clearly defined cavities, not uncommonly containing a tooth.

Complex odontomes are irregular masses of enamel, dentine, and cementum with a fibrous capsule seen as a dark line surrounding the calcified structure. Composite odontomes are made up of any number of separate structures resembling badly formed teeth. They may be cystic or resemble the complex type when they are encapsulated. Geminated odontomes are caused by the fusion of two teeth. Dilated odontomes are in one part (the root) bulbous, clubbed, mushroomed, or hollowed out.

Osteitis fibrosa, local type, is by no means rare. The author distinguishes three types: The first type occurs in the maxilla in young patients and results in a swelling of the molar and premolar region. The newly formed bone has a homogenous density, is stippled like the peel of an orange, and at operation is found to be quite soft.

The second type found in older patients forms new bone from the border of the maxilla, interfering with closing of the mouth. It is dense and structureless and very hard.

The third type occurs in the mandible, which shows an increase in depth. The x-ray film appears like "ground glass," "granular," or stippled. There may or may not be areas of rarefaction. The bone is found to be hard at operation. In all cases histologic structure is that of osteitis fibrosa.

The article treats these diseases principally from the point of view of roentgen diagnosis. The illustrations, twenty roentgenograms, are excellent.

Recent Results From Teleradium Irradiation of the Buccal and Jaw Carcinoma at the Clinic of Radiology in Lund. (Disherige Resultate von Teleradiumbestrahlung beim Buccolund Kieferkarzinom an der Radiologischen Klinik in Lund.) By Lars Edling, *Acta Radiol.* **18:** 97, 1937.

During the last ten years irradiation therapy has become the method of choice in the treatment of oral carcinoma. The treatment presents certain difficulties: 1. In case of carcinoma of the cheek there is danger of overdose on account of the thinness of the soft tissue; this may result in disintegration. 2. In case of carcinoma of the mandible the carcinoma develops in the thin gingiva bordering the radio-sensitive periosteum. Treatment in too large doses may lead to bone necrosis, especially in the presence of gingival or dental infection. 3. Because regional metastasis occurs early in oral carcinoma a permanent cure is not so easily obtained. The material therefore was placed into three groups:

- I. Cases without palpable metastases
- II. Cases with palpable, but movable metastases
- III. Cases with fixed metastases

From 1925 to 1935 the following cases received treatment:

1. Thirty-eight cases of carcinoma of the cheek: of this group 22 were males, 16, females (57.9 and 42.1 per cent). Regarding age 26 patients were between fifty-one and seventy years of age; 12 cases spread over other decades. Sixteen cases belonged in Group I, 9 in Group II, 13 in Group III. Sixteen cases were small, 10 included practically the entire buccal mucosa and 12 involved neighboring structures, such as the alveolar process. Of the 38 patients, 12 (31.5 per cent) were cured (8 in Group I, 3 in Group II, plus two who died with other diseases, after four and one-half and one and two-thirds years, one in Group III). There were 22 five-year cures of which 7 were permanent (30.8 per cent).

2. Forty-one patients with mandibular carcinoma (gingiva): of this group 33 were males, 7, females. Nine were in the age group from fifty-one to sixty years, 9 in the group from sixty-one to seventy years, 18 in the group seventy-one to 80 years. Sixteen cases belonged in Group I, 17 in Group II, and 8 in Group III. Nine (22.5 per cent) were cured (6 in Group I, plus one dead with other disease, after three and one-half years, none in Group II, one died of other disease, after three and two-thirds years, and 3 in Group III). In 4

patients the tumors were small, in 18 patients five or six teeth were involved, and in 18 the entire half of the jaw, floor of the mouth, and tongue. In 26 of these patients there were only 3 five-year cures (11.5 per cent). The writer believes this poor showing was due to the advanced ages of the patients, the large size of the tumors, and the many regional and often inoperable metastases.

The treatment consisted of teleradium combined with such other measures as roentgen irradiation, electroendotherapy, surgery, and intubation with radium. Many of the cases, the writer states, were so far advanced that the patients would not have been accepted for treatment in other clinics.

Editorials

The Thirty-Fifth Annual Meeting of the American Society of Orthodontists

The thirty-fifth annual meeting of the American Society of Orthodontists was held in Chicago, on April 19, 20, 21, and 22, 1937. The meeting proved to be a splendid one. It was beautifully arranged and held in the spacious Edgewater Beach Hotel on Lake Michigan.

The attendance of this meeting contrasted sharply with the attendance twenty years ago when there was only a handful of orthodontists from all over America. Over 400 men registered at this meeting in Chicago and of these probably 98 per cent specialize in the practice of orthodontia. The registrations were from all parts of the United States—from Maine to California, from Canada to Mexico, as well as from Cuba, Palestine, and some European countries. The scientific program was carefully arranged and was presented on time with very little irregularity. On May 19, the first day of the meeting; the usual golf tournament was held, followed by the stag dinner the same evening. The dinner was concluded by the presentation of the prizes for the day's golf tournament, as well as prizes for the trap shooting event, which was held at the Lincoln Park Gun Club. Outstanding this year were the scientific exhibits, presenting many things of interest. Something new as an attraction were the hobby clinics, which included everything from jewelry and devices to prevent thumb-sucking to summer camps and photography.

The president's banquet, held on Wednesday evening, April 21, was an elaborate affair, beautifully staged and well attended. At this time the Albert H. Ketcham award was bestowed upon Dr. John Mershon, of Philadelphia, in token of valuable and outstanding contribution to orthodontic advancement. The clinics held on Tuesday evening, April 20, proved to be most interesting and were enthusiastically attended and received by the members.

The plans for the reorganization of the society were completed at this meeting and were formally accepted by the organization with certain amendments and modifications, which will be mailed to the members from the secretary's office in the very near future. Another year will be required before the new organization will start functioning in earnest. The following officers were duly elected and installed: president, Dr. James D. McCoy, Los Angeles, Calif.; president-elect, Dr. Frank A. Delabarre, Boston, Mass.; vice-president, Dr. Oscar E. Busby, of Dallas, Texas. (The latter was appointed by the *Ad Interim* Committee to serve out the term of vice-president Dr. Frederic T. Murless, Jr., of Hartford, Conn., who previously resigned.) Dr. Claude R. Wood, of Knoxville, Tenn., was elected secretary-treasurer; Dr. Frederic T. Murless, Jr., of Hartford, Conn., was elected to serve on the American Board of Orthodontia for a period of seven years. Dr. Murless succeeds Dr. Albert W. Crosby, of New Haven, Conn., whose term of office expired. Los Angeles, Calif., was selected as the place of meeting of the society. The time of this meeting will be voted upon later by members of the organization by means of

a questionnaire, which will be sent out by the secretary's office to the membership. The following resolution was introduced and regularly passed by the society:

"WHEREAS, The good name of orthodontics demands the upholding of those fine traditions established by our better practitioners since the inception of our specialty; and

WHEREAS, It is highly important that an example be set for younger men coming into orthodontics; and

WHEREAS, Methods employed from time to time by men in the specialty of orthodontics to gain publicity either through display cards in the public press or by promotional articles appearing therein at the instigation of influential friends tend to belittle our specialty and place it upon a status resembling advertising dentistry; therefore, be it

Resolved, That this Council urge upon all members, be they young or old, the necessity of putting forth every effort to uphold the finer amenities of professional life, to the end that orthodontics may maintain its place not only in the field of learning but also in good breeding and prestige along with the other medical and dental specialties."

The thirty-fifth annual meeting of the American Society of Orthodontists is now history. This meeting under the leadership of Dr. Paul G. Spencer and his official committees will go down on the record as one of the outstanding meetings held by the Society. Dr. Spencer was presented with the Past President's Key, the last presentation of its kind under the aegis of the American Society of Orthodontists, as this original society passed out of existence at the close of the meeting of 1937. The officers and committees responsible for the 1937 meeting of the American Society of Orthodontists did a good piece of work.

—H. C. P.

The Ketcham Seminar

It was long the plan of Dr. Albert H. Ketcham to promote the study of orthodontia through discussion groups which would bring his friends to Denver and the Rocky Mountains. The Summer Seminar was organized in 1936 by a group of his friends and associates in the hope that it might realize in some measure the wish which ill health prevented him from carrying out.

The approval of those attending the first Seminar and their expressed desire that it be continued as an annual event support the belief that it may become not only a contribution to orthodontic education but a tribute to the memory of Dr. Ketcham.

According to its sponsors in Denver, it is intended that the program from year to year will be essentially a flexible one, changing to follow the trend of orthodontic thought and progress. Following the consensus of opinion of

those attending the first seminar, this year's program retains many of the features of last year's with the addition of new leaders and material.

The Summer Seminar is definitely not a course for the preparation of dentists not already orthodontists. Requirements for participation are the same as those for membership in the American Society of Orthodontists, exceptions being made for nonmembers, whose standards, preparation, and ability make them valuable additions to the group. The group will be limited to thirty members.

This year the second Summer Seminar will be held at the University of Colorado, School of Medicine, Denver, Colorado, from July 17 through July 25, 1937.

An Open Letter on Dental Journalism

THE following is an open letter written by Dr. James D. McCoy of Los Angeles, Associate Editor of the INTERNATIONAL JOURNAL OF ORTHODONTIA AND ORAL SURGERY. This letter was sent to the assistant secretary of the American College of Dentists in reply to a form letter which had previously been sent out by the assistant secretary inquiring as to the attitude of editors of independent dental journals, on the journal controversy, which had been inspired by the American College of Dentists.

Editor.

September 18, 1936.

Dr. Wm. J. Gies,
Assistant Secretary,
American College of Dentists,
632 West 166th Street,
New York, N. Y.

Dear Dr. Gies:

Your letter of July 27th reached me some time ago, and I have read it carefully. In view of the fact that you have included rather voluminous material, covering the subject of dental journalism and the attitude of the American College of Dentists toward it, I am taking the liberty of replying somewhat fully, for all right-minded professional men agree that the journals representing our profession should fulfill certain requirements in ethics, comply with the better traditions of dentistry, fulfill useful purposes to the profession, and otherwise reflect credit upon it, to the end that its prestige will be favored among its own members and those of other professions of equal moral and intellectual standing.

When the American College of Dentists started its campaign "to improve dental journalism," the motive met with the universal approval of all right-minded members. Their condemnation of the cheap, trashy, so-called journals sent free to the members of the profession and maintained by agencies as media for propaganda for the sale of dental merchandise, also achieved popular acclaim. When, however, such journals as the INTERNATIONAL JOURNAL

OF ORTHODONTIA AND ORAL SURGERY was included with this group and condemned, and we were informed of this fact, it became immediately obvious that those responsible for such a decision either had failed to gather the true facts or were motivated by a degree of intolerance or fanaticism which had blinded their vision. It is only natural to assume that those publishing houses considered competent to supply the medical and dental professions with standard and special textbooks *might also be considered safe to supervise the publishing of journals which, in the end, supply information similar to that supplied in textbooks*, and do this without subjecting the professions to the peril of insidious propaganda or information detrimental to their well-being.

You may or may not know that the INTERNATIONAL JOURNAL OF ORTHODONTIA AND ORAL SURGERY is published by The C. V. Mosby Company of St. Louis, which is in the publishing business. This journal has long been the official organ of the American Society of Orthodontists, the European Society of Orthodontia, the British Society for the Study of Orthodontics, and six other recognized orthodontic societies which, for the sake of brevity, will not be named. The subscription price is \$7.00 per year. It is edited by a past-president of the American Society of Orthodontists. Three of the associate editors are past-presidents of the same organization; one is its chief executive at present; and another has recently been elected to the office of president-elect. The consulting and the associate editors in departments devoted to dentistry for children, oral surgery, and orthodontic abstracts, are men of outstanding ability and the highest professional character in the fields they represent. This same C. V. Mosby Company is also the publisher of seven medical journals; viz., *The American Journal of Obstetrics and Gynecology*, *The Journal of Pediatrics*, *The American Heart Journal*, *The Journal of Laboratory and Clinical Medicine*, *The Journal of Allergy*, *The Journal of Thoracic Surgery*, and *The American Journal of Syphilis, Gonorrhea, and Venereal Diseases*. Each of these represents certain medical societies as official organs, publishing their proceedings, and otherwise being utilized to serve the interests of their members. The group of physicians who act as editors, associate editors, and contributing editors are men of unquestionable character and ability. None of these publications are free, the subscription rates ranging from \$7.50 to \$10.00 a year.

In the case of the INTERNATIONAL JOURNAL OF ORTHODONTIA AND ORAL SURGERY, the publishers have at all times allowed the editors to dictate the policy of the journal; have been generous in meeting our demands as to the physical character of the magazine; with the result that its illustrations and other helpful features *are not exceeded by any other medical or dental journal*. They have, for many years, refused to accept advertising which was objectionable, or which in the opinion of our Board would not meet acceptable ethical standards. In other words, the dictates of our Board, and of the Publication Committee, of the American Society of Orthodontists have been accorded every opportunity to control the journal, to the end that it might serve orthodontics and certain other special fields related to it in the best possible manner. One thing we have not had to face has been the necessity of worrying about costs of paper, printing, half-tone engraving, or the numerous other details of the publication business, and at the end of each year, the members of the American Society

of Orthodontists, in good standing, have received from the C. V. Mosby Company a bound volume of the society's proceedings. It would seem, therefore, that if orthodontics is possessed of a rich literature, and you in fairness will admit that in this respect it is the most fortunate of all the dental specialties, then the INTERNATIONAL JOURNAL OF ORTHODONTIA AND ORAL SURGERY must be given the major credit for accumulating, combining and preserving all this rich material, for their efforts along this line extend back through more than twenty years. As the American Society of Orthodontists has not had to bear the financial responsibility of this task, it carries in its treasury today a comfortable balance, and in past years has been able to contribute generous sums to more than one research project.

In view of these facts, the series of statements in your letter, quoted as having been presented at a meeting of the American Association of Dental Editors, if applied to the INTERNATIONAL JOURNAL OF ORTHODONTIA AND ORAL SURGERY—and I presume they are, or you would not have written to me—become so ridiculous, reflect such a petty state of mind, and harbor such a spirit of intolerance that for reasonableness they can only be compared to what might be expressed in an address by Adolf Hitler to the House of Israel. If the statements were directed against trashy pernicious agencies of propaganda for the sale of quack remedies, they might be considered as being applicable; but when directed against magazines long devoted to the interests of dentistry, whose helpfulness has been written into the hearts and lives and abilities of thousands of sincere practitioners, one is led to wonder whether the breed who used to burn women as witches in New England, torture those who refused to conform to some religious sect, wear a bag of asafetida around the neck to keep off infectious diseases, has not come back to life in considerable numbers. It is difficult to feel that the American College of Dentists, which undoubtedly was organized with lofty motives, could approve of anything so foreign to the true spirit of ethics, unless, as a body, it has greatly degenerated. When this organization came into being, it was supposed that those who were asked into fellowship would be men who, through their efforts to do constructive work for the advancement of dentistry, would earn such recognition as a reward. Those of us who were inducted during the early years were led to believe that the "F.A.C.D." would bear the same relationship to dentistry that the "F.A.C.S." does to medicine. In other words, it was something to be earned. Alas, how times have changed; and as we look through the list of some of those now wearing this decoration, we are led to ponder, for we find in all too numerous instances those who bear no other distinction than being politicians of the "peanut type," or henchmen of "intellectuals" of this variety. In some instances, fellowships have been given to those who, in their own communities, are definitely the subject of ridicule by the better informed members of the profession, with the result that in more than one instance where able and deserving men have been nominated or proffered nomination, they have refused it. In a communication sent out by the College prior to the meeting in San Francisco, the following statement appeared: "We are convinced that there is some uncertainty in the minds of many of our Fellows in regard to the proper functions of the College." That was an unusually true

statement, but it might have been amplified in an equally truthful manner by stating that there was less uncertainty in the minds of thousands of ethical practitioners of dentistry relative to the College, for they have it sized up fully and in its true light. It may be interesting to you to know that the feeling is quite general that unless something be done to restore prestige to the American College of Dentists, many a certificate will find a place in the most convenient ash-can.

In the matter of publications, and those who sponsor them, it might be well for the American College of Dentists to inform itself in the matter of magazines sponsored by other medical publishers than The C. V. Mosby Company. This subject carried to finality would reveal the fact that Messrs. Lea and Febiger of Philadelphia, the oldest medical publishing house in the United States, are likewise the owners of our oldest medical journal, *The American Journal of Medical Sciences*. The J. B. Lippincott Company own and publish *The Annals of Surgery*. In the case of both magazines, your "fact-finding committee" will learn that they are published under the same general policy as the INTERNATIONAL JOURNAL OF ORTHODONTIA AND ORAL SURGERY. It is unnecessary for me to tell you that any medical practitioner having an article published in the medical magazines mentioned, feels honored when it is accepted. A well-known medical publisher of Chicago gets out a series of year books upon medical subjects, edited by men whose motives can scarcely be questioned. Each subject is handled in the form of abstracts from the current literature of the year upon the subject, and the material is prepared in such a manner as to prove helpful in different fields. These annuals are, in principle, the same as quarterlies or monthlies, as you will readily admit. Notwithstanding this fact, however, I have never heard of any medical group protesting their publication, or objecting to the other magazines I have mentioned as being the property of medical publishing houses. Doubtless, the American College of Dentists has advanced farther in the field of learning, culture, and ethics, and for that reason wishes to set new standards. It has generally been supposed that "handsome is as handsome does," which might lead us to wonder why some "non-proprietary magazine" does not get out a journal of such excellence that it outshines such "inferior publications" as the INTERNATIONAL JOURNAL OF ORTHODONTIA AND ORAL SURGERY. If the American College of Dentists would do this, it would doubtless stimulate us to greater efforts and, as a result of this competition, the profession would be better served. Almost any one will admit that some of the non-proprietary journals are so amateurish in character, both in their physical aspects and in the material they produce, that only with effort can we prevent the proverbial "lump forming in the throat, and the tear coming to the eye."

Your letter contained several interesting statements, one of which referred to proprietary dental schools. I quote: ". . . the American Association of Dental Schools . . . in 1923, by constitutional provision, barred from membership all proprietary dental schools, of which *now there are none*." Surely you must have had your tongue in your cheek, and must have written that statement with embarrassment. Doubtless what you meant was that there are no longer any stock-owned dental schools, for all have been reorganized, and many of

them have become integral parts of universities. You doubtless knew full well, however, that in some instances it was just a case of "giving the old barn a new coat of paint," with the same old gang in control, with dividends being included in the form of payroll. If you take the trouble to investigate this statement, you will doubtless gain facts which have to be winked at, and prominent in each such institution you will find those having certificates of fellowship from the American College of Dentists. Of course, the deans of these schools are all men of profound learning, high professional accomplishments, and if they went into private practice would literally outstrip all competition because of their superior abilities. Their public appearances, because of the beautiful English they speak and the range of subjects they can discuss with grace and ease, reflect great credit upon the profession of dentistry. Never do they make such slips as to say, "I seen" or "I done," or fall down over such simple things as their pronouns. Of course, in some few instances, when such men are surveyed carefully, one realizes that some second-grade barber shop was wantonly robbed when these "critters" went into dentistry.

The group of statements included in your letter quoted as having been made at meetings of the American Association of Dental Editors and Omicron Kappa Upsilon, honorary society, brings forcefully to my mind one of the incidents contained in that contribution to classical literature by the immortal Cervantes, outlining the adventures of Don Quixote of La Mancha and his droll squire Sancho Panza. Of these, you will doubtless recall the one wherein an official of a certain village lost his ass. A diligent search failed to reveal its whereabouts, and he had all but given up hope when one day he met a fellow-townsman in the plaza who told him that he had, on the previous day, seen the missing animal in a nearby wood and offered to take him to the very spot. They set out immediately and finally came to the place, but the ass was nowhere to be found. Then, said the owner to his friend: "I can with the greatest ease bray so much like an ass that even the ass himself is deceived. I will, therefore, go deep into the woods and bray, and if my animal is anywhere about he will hear me and bray in return." Said the other: "You may think you are a good brayer, but I know I can outdo you in this art, so I too will go into the woods and bray, while you do the same, so that one or the other will surely attract the ass." They then separated and when some distance apart started braying and did their work so well that each thought the other was the real ass, and so the two came together again. Again they separated and brayed and brayed and brayed, only to be drawn together, for it seems that the wolves had devoured the real ass, whose carcass they later found. Upon returning to their village, they gave an account of their experiences, with the result that others in the town started the practice of braying until the whole village vied with each other in this form of imitation. Neighboring villages also brayed, but in derision of the village which started the custom, and so it came about that resentments arose which all but brought on a civil war within the province. In referring to this bit of literature, I do so with confidence, knowing that you personally have read the classics, including the one mentioned. To expect many of those you represent, however, to get the implication would, I fear, be

expecting too much. Judging from their "assumptions and conclusions," however, I am led to wonder whether or not their mental processes do not at times rival those of Don Quixote himself.

It is not difficult to conclude that regardless of the attitude of the American College of Dentists or the American Association of Dental Editors, the JOURNAL, which it is my honor to represent, in part, will continue to fulfill the high mission which has engaged its activities for more than two decades; and, with the passing of time, I hope that I may still be considered worthy of playing a part in its efforts. Furthermore, I am assuming an optimistic attitude toward the groups you represent, carrying the hope that we may yet be able to look to them as exemplifying the finer concepts of ethics, as enriching dental literature, and establishing journalism upon such a high plane that we outsiders will be inspired to follow suit.

Faithfully yours,

(Signed) *James D. McCoy.*

News and Notes

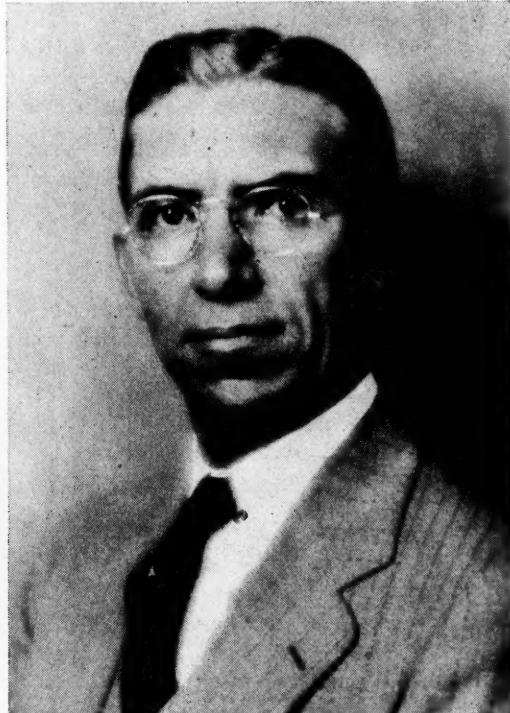
Southwestern Society of Orthodontists Pays Tribute to Flesher and Spencer

The annual banquet of the Southwestern Society of Orthodontists, held during the recent session in Shreveport, was dedicated to the two men who have achieved the highest honors of the American Society of Orthodontists; namely, Dr. Wm. E. Flesher, president of the American Society in 1934; and Dr. Paul Guy Spencer, president of the American Society of Orthodontists in 1936.

Dr. T. W. Sorrels made the following tribute: "We are honoring, in our humble but no less sincere way, two of our most distinguished members. . . . It is by their works and not



Dr. Wm. E. Flesher



Dr. Paul G. Spencer

their faces that you should know them best. These men, by their aptitude and understanding, have rendered noteworthy service and achieved national prominence in the ranks of the profession. We wish to pay tribute to them for their faithful and unselfish service by offering words of commendation and acts of appreciation.

"They have done nobly;
May others be inspired
To do as much;
For as yet
There is so much undone."

Dr. Guy Gillespie was master of ceremonies. He called on Dr. T. O. Gorman, the first president of the Southwestern Society, to introduce the recipients. He then called on Dr. T. G. Duckworth for a few remarks, and a short biography of Dr. Spencer.

Dr. Duckworth concluded his talk by saying: "I would like to pay tribute to a man who is a friend of all young dentists and is especially sympathetic with the Texas orthodontists. This man is a bosom friend of Guy Spencer's, and when you think of one you associate them together.

"Dr. J. O. Hall, of Waco, placed a hand of approval on Guy's shoulder and made his task in building a practice much easier. Dr. Hall's influence, council and advice were willingly placed at Guy's command. There is a feeling of gratitude on Guy's part and shared by all those who know the facts. I am especially grateful for what Joe Hall has done for Guy, as I was probably responsible for their first conference. I am not unmindful of the fact that Guy did his part, which is evident in the position he occupies today as president of the American Society of Orthodontists.

"To Bill, Guy and Joe, wherever your path may lead, may you take it with firm step and a happy heart, and may the road's next turn prove to be the best."

Following this, Dr. Homer B. Robison made a few remarks relative to Dr. Flesher, and he gave a short sketch of Dr. Flesher's life and closed with the following: "I am pleased to see this honor extended these gentlemen, who are worthy of such a gesture. In the past it was customary to wait until people passed on before we recognized their greatness and I am gratified that this society has seen fit to digress.

"I would like to recite a short poem which I feel is quite apropos, but not insinuating that they are on the threshold of Eternity, for they are going to be with us many years and continue their good work for the advancement of our profession.

"If with pleasure you are viewing
Any work a man is doing,
If you like him or you love him,
Tell him now.

"Don't withhold your approbation
Till the parson makes oration
And he lies with snow white lilies o'er his brow
And no matter how you shout it
He will never know about it.
He will never know of teardrops you have shed.

"So if you think some praise is due him
Now's the time to slip it to him
For he cannot read the tombstone
When he is dead."

Dr. Gorman then presented to Dr. Flesher and Dr. Spencer plaques attesting the award of life membership in the Southwestern Society. The awards, oak shields surmounted by bronze plaques, were inscribed: "Awarded to [the men's names] a life-time membership for distinguished and unselfish service to orthodontia, by the Southwestern Society of Orthodontists, January 19, 1937."

Dr. Spencer then responded and in his inimitable way cast the honors to Dr. Flesher and his own colleagues. Dr. Flesher's response followed in a few words of thanks and an expression of his pleasure to serve.

Honors done, it seemed that all present were imbued with a spirit to serve orthodontia for a bigger and better tomorrow.